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Considering a Cadre Augmented Army

Christopher Ordowich

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PREFACE

This dissertation explores the possibility of integrating a new type of unit into the United States Army. The impetus for this analysis is a recent shift in Department of Defense force planning from planning primarily for wars fought *without* rotation to wars fought *with* rotation. This dissertation analyzes the attractiveness and feasibility of integrating a new type of unit into the Army from three perspectives: budgetary, operational, and historical. It is intended to stimulate debate about the future size and mix of the Army when planning for wars fought with rotation.

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SUMMARY

This dissertation considers whether integrating a new type of unit into the U.S. Army could reduce costs without significantly increasing military risk. A new type of unit is now worth considering because the Department of Defense (DoD) recently changed its force planning guidance. The DoD shifted its focus from planning primarily for wars fought *without* rotation to planning for wars fought *with* rotation. In a force designed for use with rotation, some units are not needed as quickly as they were in a force designed for use without rotation. Those units that are not needed quickly could be maintained at a lower level of readiness without a significant increase in military risk. Maintaining these units at a lower level of readiness would lower costs because there is a tradeoff between the peacetime cost and readiness of a unit.

The Reserve Component (RC) has historically served as the low-cost, low-readiness force. However, RC combat units are maintained at an unnecessarily high level of readiness for some slots in a rotation. The DoD may wish to consider maintaining some units at a level of readiness lower than that of the RC to reduce costs without significantly increasing military risk.

This dissertation examines one way to do this by analyzing a force augmented by *cadre* units. Cadre units retain only leaders (officers/non-commissioned officers) during peacetime and are brought to full strength only in wartime. Cadre units offer a cost-effective hedge against the need to rotate large numbers of units overseas in future wars. The dissertation analyzes the attractiveness and feasibility of integrating cadre units into the Army from three perspectives: *budgetary*, *operational*, and *historical*. This dissertation is comprised of three separate papers, each of which analyzes cadre forces from one of these perspectives.

The budgetary analysis of a cadre augmented force shows that cadre units can offer annual cost savings measured in billions of dollars. This analysis explores various ways to integrate cadre into the total force. No matter which way cadre units are integrated, this paper shows that a cadre augmented force can significantly reduce annual defense costs. However, these cost savings are accompanied by an increase in military risk. This paper presents the tradeoffs between cost and military risk for the reader to consider.

The operational analysis discusses how cadre units could work in practice. This analysis focuses on how cadre units could be structured, organized, and equipped in peacetime and activated, filled out, trained, and demobilized during wartime. The most important issue discussed in this chapter is the ability of the army to expand during wartime to fill out cadre units. We find that increased recruiting alone cannot fill out a cadre force that mobilizes at a rate of more than one combat unit per year. Therefore, we explore the possibility of activating members of the Individual Ready Reserve (IRR) or offering bonuses to Reserve Component (RC) personnel to serve in cadre units. Both of these approaches have disadvantages; they both require significant changes to army personnel policies and can reduce the cost savings from cadre. The ability to fill out cadre units with junior personnel in wartime appears to be the major barrier to implementing a cadre augmented force.

The final analysis in this dissertation is a historical analysis of cadre forces. Cadre forces have been proposed many times throughout the history of the U.S. Army. The historical analysis shows that cadre units have been proposed in the past for two main reasons, either because there was a change in the threat perceived by the Army or because there was a change in the perceived effectiveness of the reserves. This analysis also discusses

the similarities and differences between pervious cadre proposals and the cadre forces analyzed in this dissertation.

This research will be of interest to defense policymakers at a variety of levels. From those making decisions about the future structure of the Army, to those looking at a broader picture of defense planning, the analyses in this dissertation provide a new set of alternatives to consider.

ACKNOWLEDGMENTS

ACRONYMS

Symbol	Definition
AC	Active Component
AIT	Advanced Individual Training
ARFORGEN	Army Force Generation
ATRRS	Army Training Requirements and Resources System
BCT	Brigade Combat Team
BCT	Basic Combat Training
BUR	Bottom Up Review
CFE	Conventional Forces in Europe
CS	Combat Support
CSS	Combat Service Support
CBO	Congressional Budget Office
CMTC	Citizens Military Training Camp
DMDC	Defense Manpower Data Center
DOD	Department of Defense
DSB	Defense Science Board
EAD	Echelon Above Division
ESB	Enhanced Separate Brigade
ERC	Enlisted Reserve Corps
FID	Foreign Internal Defense
FY	Fiscal Year
GWOT	Global War on Terror
HDE	Heavy Division Equivalent
IISS	International Institute for Strategic Studies
IRR	Individual Ready Reserve
JMNA	Joint Military Net Assessment
JRTC	Joint Readiness Training Center
LMI	Logistics Management Institute
LWAM	Long War Assignment Model
MRC	Major Regional Contingency (Conflict)
MSO	Military Service Obligation
MTW	Major Theater War

NCO	Non-Commissioned Officer
NGA	National Guard Association
NDA	National Defense Act
NTC	National Training Center
ORC	Officers' Reserve Corps
OSUT	One Station Unit Training
QDR	Quadrennial Defense Review
RC	Reserve Component
ROTC	Reserve Officers' Training Corps
RSO	Ready-Standby Organization
SOF	Special Operations Forces
SSB	Special Separation Benefit
SSC	Smaller-scale Contingency
TDA	Table of Distribution and Allowances
TIS	Time in Service
TOE	Table of Organization and Equipment
TPD	Time-Phased Deployment
TRADOC	Training and Doctrine Command
TTHS	Trainees, Transients, Holdees, and Students
USATC	United States Army Training Center
VBA	Visual Basic for Applications
VSI	Voluntary Separation Incentive

Introduction

This dissertation considers whether integrating a new type of unit into the U.S. Army could reduce costs without significantly increasing military risk. A new type of unit is now worth considering because the Department of Defense (DoD) recently changed its force planning guidance. The DoD shifted its focus from planning primarily for wars fought *without* rotation to planning for wars fought *with* rotation. In a force designed for use with rotation, some units are not needed as quickly as they were in a force designed for use without rotation. These units could be maintained at a lower level of readiness in peacetime and still be ready to deploy in the timeframe implied by rotation.[1] Maintaining these units at a lower level of readiness will reduce costs because there is a tradeoff between the peacetime cost and readiness of a unit. This paper explores whether integrating *cadre* units into the total force could reduce costs without significantly increasing military risk. Cadre units retain only leaders during peacetime and are brought to full strength only in wartime. The following sections discuss the implications of the recent shift in DoD planning and introduce a role for cadre units.

I—A SHIFT TO PLANNING FOR ROTATION

Since the end of World War II, the U.S. military has planned primarily to fight two major wars simultaneously.[2] During the Cold War, this meant planning for a global war fought in more than one theater. After the end of the Cold War, the DoD began sizing the

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[1] Throughout this dissertation, we define readiness as what Betts (1995) defines as operational readiness: "how soon an existing unit can reach peak capability for combat." [Betts (1995), p. 40]

[2] Hoehn and Ochmanek (2008) wrote: "Since 1950, when President Truman decided to fight to preserve the independence of South Korea, the United States has made it a policy to field sufficient military forces to deter — and defeat — large-scale aggression in two distinct parts of the globe more or less simultaneously."

force to fight two separate Major Regional Contingencies (MRCs).[3] This planning was

explicit in the 1995 National Military Strategy of the United States:

> "US forces will be sized and structured to achieve decisive victory in two nearly
>
> simultaneous major regional conflicts and to conduct combat operations
>
> characterized by rapid response and a high probability of success."
>
>   - 1995 National Military Strategy of the United States[4]

The Base Force, which was proposed in the 1992 Joint Military Net Assessment

(JMNA), defined this two-war force sizing heuristic. Figure I shows that the Base Force

could only fight two simultaneous wars (Global War) by deploying all forces at once.

Figure I—Two MRCs Requires Deploying All Forces for the Duration of the War[5]
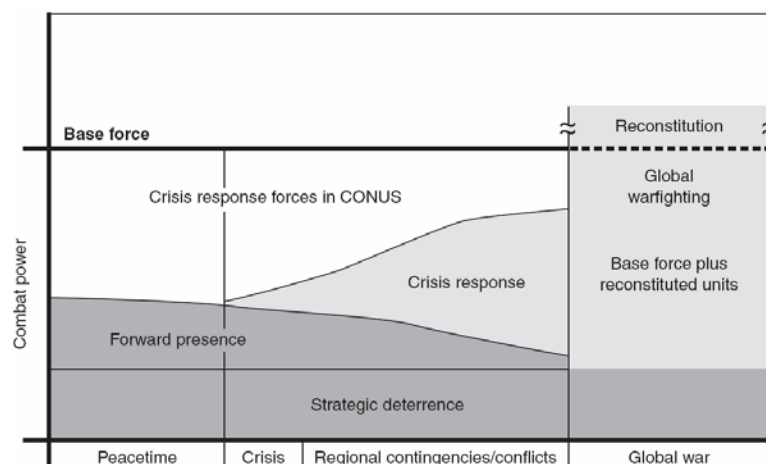
This two-war force sizing heuristic created a base force that could only fight two

major wars by deploying all units for the duration of those wars. This force did not have the

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[3] Larson et al (2001). The term used to describe these large regional conflicts evolved throughout the 1990s. The George H.W. Bush administration began by calling them Major Regional Contingencies (MRCs). The Bottom-Up Review changed the term to Major Regional Conflicts (MRCs). The 1997 Quadrennial Defense Review changed the term once again to Major Theater Wars (MTWs). [Troxell (1997), p. 40]
[4] Shalikashvili (1995), p. 17
[5] Powell (1992a). Extracted from Larson et al (2001), p. 13.

ability to rotate forces if both contingencies lasted a long time. At the time, this was

considered at acceptable risk.

Operations in Iraq and Afghanistan have required maintaining more than 100,000

troops deployed overseas for nearly five years. The DoD has chosen to sustain these

deployments by rotating units overseas. This has led the DoD to alter its force sizing

heuristic. When Active Component (AC) forces are used according to DoD rotation

guidance[6], sustaining these rotations requires that there be two units at home for each unit

deployed. This has led the DoD to acknowledge that rotation drives force-sizing decisions.

The DoD first made this explicit in the 2006 Quadrennial Defense Review (QDR):

> "For the foreseeable future, steady-state operations, including operations as part of a
> long war against terrorist networks, and associated *rotation* base and sustainment
> requirements, will be the main determinant for sizing U.S. forces."
>
> - 2006 QDR (emphasis added)[7]

In April of 2007, Ryan Henry, the Undersecretary of Defense for Policy further

emphasized this point in an interview: "The sizing part of the force is not driven by the

major combat operations … but it is driven more by the prolonged, irregular campaign

where you're *rotating* forces in."[8]

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[6] As of early 2007, DoD rotation guidance for the AC called for one year deployments followed by two years at home (Schoomaker, 2006). As of mid-2007, rotation practice differed significantly from guidance. AC combat units have been deployed to Iraq and Afghanistan for 15 months (Garamone, 2007) and are at home only one year between deployments (Korb, Rundlet, and Duggan, 2007).
[7] DoD (2006), p. 36
[8] Bennett (2007), emphasis added. A similar point is also made in DSB (2004): "The force sizing construct used since WW II needs to be changed … A smaller force may be needed to defeat opponents than that needed for Stabilization and Reconstruction operations." [DSB (2004), p. 17]

The Army has also shifted its force structure paradigm to plan for rotation. As of mid-2007, the Army is changing from a system of tiered readiness to a system of cyclical readiness called Army Force Generation (ARFORGEN). Under ARFORGEN, units rotate through three readiness pools as shown in Figure II: reset/train, ready, and available.

Figure II—ARFORGEN Rotation Plan[9]
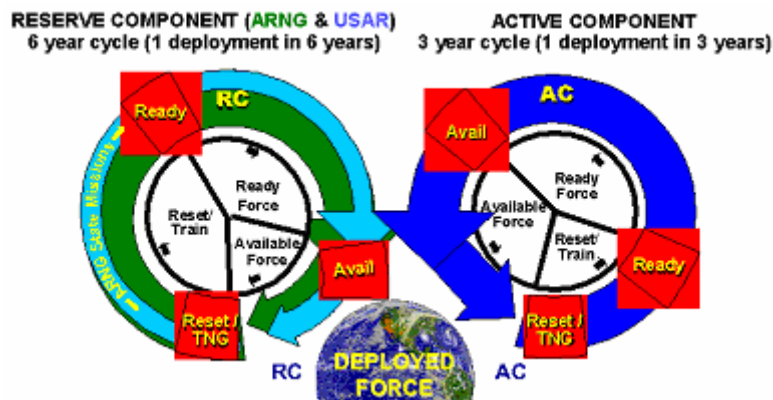
Figure II shows that ARFORGEN rotates active and reserve units through the three different force pools over time. This plan implicitly assumes that units rotate home after a fixed period of time deployed rather than deploying units for the duration of a conflict.

In response to this change in force planning, this dissertation considers whether a change in the force mix might be appropriate. The force mix that was optimal for fighting two simultaneous wars without rotation may no longer be optimal for fighting wars fought with rotation.[10]

II—IMPLICATIONS OF ROTATION FOR READINESS

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[9] McNeil (2005)

[10] The impetus for this analysis is best described in a 2007 Defense Science Board report, which states that the Army needs "to rethink how force structure is allocated between the active and reserve components for the global war on terrorism, which could involve lengthy stabilization and reconstruction periods following combat. The challenge the Army faces is buying forces based on whatever 'future' they are planning for." [DSB (2007), p. 24]

In a force designed for use with rotation, some units are not needed as quickly as they were in a force designed for use without rotation. If the DoD adheres to the stated rotation guidance as of 2007[11], the analysis below shows that limiting the Army to only Active Component (AC) and Reserve Component (RC) units leads to a force with some units that are maintained at an unnecessarily high level of readiness. In this analysis, we assume that the AC force is not large enough to meet the wartime demand for deployed forces alone.[12] Figure III shows how the AC and RC might meet the requirements of a notional long war with rotation when force requirements are relatively predictable.[13]

Figure III—Meeting a Sustained Surge in Demand for Deployed Forces[14]
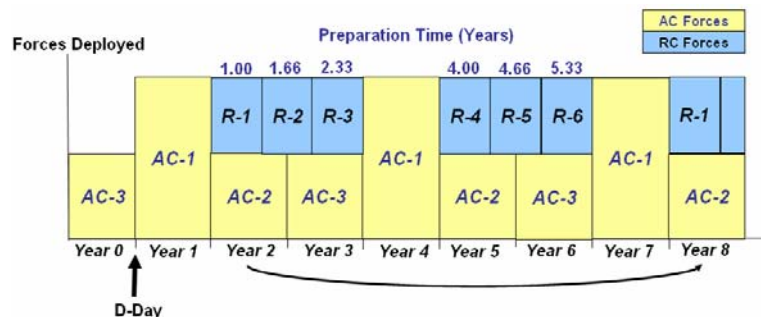
In this notional war, the demand for deployed forces surges suddenly in year one (on D-Day). Only AC units can be deployed in year one because RC units cannot deploy without

_____

[11] DoD rotation guidance for Active Component (Reserve Component) units states that for every one year deployed (mobilized), each unit should spend two (five) years at home which is represented as 1:2 (1:5). [Schoomaker (2006) and DoD (2007a)]

[12] The force structure that exists as of 2008 has about 42 AC and 28 RC combat units. Therefore, any sustained requirement for deployed forces above 14 AC units (42/3=14) would require the deployment of RC units.

[13] This analysis assumes that the demand for deployed forces is relatively predictable. For stabilization and reconstruction operations this is an appropriate assumption since these types of operations generally require a substantial commitment of ground forces for a number of years. DoD (2004) states: "the predictability and long lead time associated with rotational overseas presence allows for substantial planning and preparation of units" [DoD (2004), p. 24].

[14] This notional graph is similar to the one on page six of DSB (2004).

post-mobilization training.[15] If we assume one-year deployments for AC forces, replacement

forces are first needed at the beginning of year two. At this point, RC units, which require

four months of post-mobilization training[16], can be fully prepared for deployment. RC

combat units provide only eight months deployed per mobilization because their one-year

mobilizations include the four months of post-mobilization training. This means that new

groups of RC units are needed 1.0, 1.6, and 2.3 years after D-day to sustain deployments in

years two and three.[17] The AC units deployed in year one (AC-1) are again available for

deployment in year four after they have spent two years at home. The RC units deployed in

years two and three (R-1, R-2, R-3) are not available for redeployment again until years eight

and nine. Therefore, three new groups of reserve units are needed to augment the active

force in years five and six (R-4, R-5, R-6).

RC units in R-4, R-5, and R-6 have four to five years to prepare to deploy. These

units could be maintained at a level of readiness lower than RC units without significantly

---

[15] Under ARFORGEN, some RC units would be ready to deploy at the beginning of a conflict because 1/6 of the RC force is in the available pool at any given time. The analysis here remains valid even if RC forces are ready to deploy at the beginning of a conflict as demonstrated in the figure below.
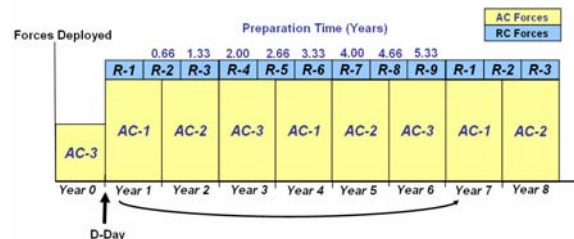
This figure shows that under ARFORGEN new groups of RC units are still needed 4.00, 4.66, and 5.33 years after D-day and these units could be maintained as cadre units without significantly increasing military risk.
[16] Army National Guard infantry units deploying to Iraq and Afghanistan have required, on average, four months of post-mobilization training. Under ARFORGEN, First Army plans to reduce post-mobilization training to one to three months. However, this requires additional pre-mobilization training. In this paper we assume that this training does not occur during peacetime because RC units are not being regularly deployed. Therefore, those RC units deployed in the first years of a war require four months of post-mobilization training. RC units deploying later in the war may require fewer months of post-mobilization training.
[17] If the AC were large enough to meet the demand in year's two and three, RC forces would not be needed at all and the argument made here is not relevant. However, in order for this to be the case, the United States would need to maintain a very large standing army.

increasing military risk. This might be desirable because there is a direct tradeoff between the readiness of a force and its peacetime cost.

III—TRADEOFF BETWEEN READINESS AND COST

The higher the readiness of a unit to deploy, the higher the cost of that unit during peacetime. In order to be ready to deploy almost immediately an AC unit costs almost three times as much in peacetime as a RC unit, which is ready to deploy only after four months of post-mobilization training. A new type of unit that would be ready to deploy later would cost even less than an RC unit. Figure IV notionally demonstrates this tradeoff.

Figure IV—Cost/Readiness Tradeoff[18]
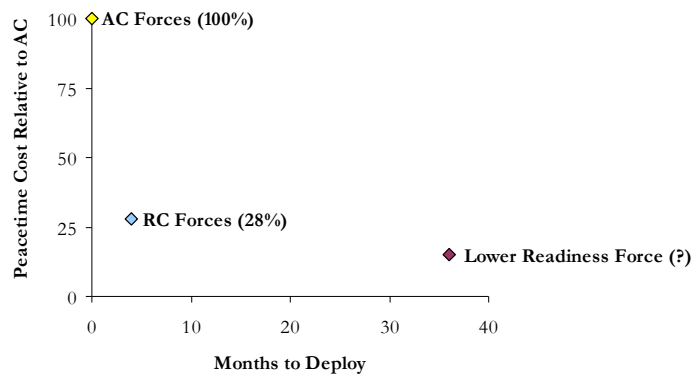
Units maintained at lower levels of readiness have lower costs because they either train less intensively and/or retain fewer personnel during peacetime. RC units are less ready to deploy than AC units because they train much less intensively.[19] A new type of unit could be maintained at an even lower level of readiness by training less intensively than the RC and/or retaining fewer personnel during peacetime.

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[18] RC peacetime cost estimate from Jaffe (2006). This is consistent with previous estimates. See Appendix A for more detail.

[19] RC units train one weekend a month, two weeks a year while AC units train full-time.

IV—REDUCING READINESS WITH CADRE

There are two ways we might think about reducing the readiness of units. The first is to reduce training intensity. RC units train one weekend a month, two weeks a year. Reducing the number of training days for RC units would reduce their cost. However, there are two reasons why this may not be an attractive approach. The first is that many of the costs of the RC are fixed costs that are incurred regardless of the number of days a unit trains in a given year.[20] The second is that many reservists join the RC because they obtain benefits from training. These benefits come in many forms including: drill pay, transferable skills[21], and social interaction. If we were to reduce training time for some units, these units might be less attractive to some reservists.

The second way we might reduce readiness is to reduce the peacetime manning levels of some units. These units would have four to five years to reach the required personnel levels before deploying. The most extreme example of this is to retain no personnel in peacetime and create new units from scratch whenever they are needed. This is what is being done after four years in Iraq and Afghanistan.[22] This process is constrained by the fact that it takes many years to develop leaders. We cannot recruit experienced leaders whenever we need them.[23] Therefore, the DoD might consider maintaining some units that retain only leaders during peacetime. These units would be capable of deploying more quickly than new units, but slower than RC units. Units that retain just leaders during

---

[20] Examples of these fixed costs include recruitment, training, and full-time support costs.

[21] Borth (2001)

[22] Sherman and Roque (2007), Department of Defense (2007b,c)

[23] This sentiment was expressed by David Chu in 1989: "we cannot get a battalion commander overnight, and a ship captain cannot become competent and confident in the use of his vessel overnight. That takes years of training and experience." [Gotz and Brown (1989), p. 117]

peacetime have been previously referred to as *cadre* units.[24] The term cadre refers to the group of leaders who would train and lead a unit when mobilized. Table I describes the key differences between AC, RC, and cadre units.

Table I—Defining Cadre

Force	Personnel Levels	Personnel Status	Training
AC	Full	Full-time	Full-time
RC	Full	Part-time	Part-time
Cadre	Only leaders	Either	Either

AC units are fully manned with full-time personnel who train full-time. RC units are fully manned with part-time personnel who train part-time. Cadre units would not be fully manned as they would retain only leaders during peacetime. In this dissertation, we explore a number of alternatives for the status and training intensity for cadre leaders.

The concept of cadre units is not new; it has been around since 1820 when Secretary of War John C. Calhoun first advocated an "expansible" army. Calhoun proposed an army that retained only officers during peacetime.[25] Since that time, the attractiveness of cadre units has been debated following almost every major war in the United States. Most recently, during the drawdown from the Cold War, the Army planned to turn two AC divisions into cadre divisions in order to hedge against the threat of a resurgent Soviet Union.[26] However, these plans were never implemented. Historically, the main criticism of cadre units was that they would not be ready to deploy quickly enough. However, we have seen that this criticism

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[24] We explore alternative peacetime duties for cadre leaders in Paper II of this dissertation. It is worth noting here that we imagine a situation in which officers and NCOs would be rotated through cadre leadership positions along with the traditional staff and line positions and would not be permanently assigned to a cadre unit.

[25] Calhoun (1820)

[26] Tice (1991a)

is no longer valid if cadre units are used to fill slots in a rotation many *years* after the

beginning of a conflict.

V—DISSERTATION OUTLINE

This introduction has asserted that limiting force mix decisions to only AC and RC

units means that some units are maintained at an unnecessarily high level of readiness when

planning for wars fought with rotation. Therefore, it is worth considering whether

integrating lower readiness cadre units into the total force could reduce costs. This paper

analyzes the possibility of replacing AC and RC Brigade Combat Teams (BCT) with cadre

BCTs.[27] There are many issues to consider regarding cadre, including:

- How much could cadre units reduce costs? What sacrifices must be made to

  achieve these cost savings? (*budgetary*)

- How would cadre units work in practice? (*operational*)

- Have cadre forces been considered before? (*historical*)

This dissertation contains three separate papers, each one examining cadre units from one of

these three perspectives: budgetary, operational, and historical.

The first paper in this dissertation analyzes cadre units from a budgetary perspective.

This paper calculates the effect of integrating cadre units into the total force on both cost

and military risk. The paper begins by calculating changes in cost and military risk from

augmenting the U.S. Army with cadre units under a baseline set of assumptions. A cadre

augmented army is a force that includes AC, RC, and cadre units. This type of force does not

completely eliminate any type of unit in favor of cadre units; it simply changes the mix of

---

[27] This dissertation focuses on Brigade Combat Teams (BCTs) because there is the most publicly available information about these units.

forces. This is important to note since many previous cadre proposals advocated replacing *all* reserve forces with cadre forces. After calculating changes in cost and risk, the paper incrementally relaxes each of the key assumptions to show that cadre units offer significant cost savings even under pessimistic assumptions.

The second paper in this dissertation analyzes cadre from an operational perspective. This paper discusses how cadre units would work in practice. This paper explores options for structuring, organizing, and equipping cadre units in peacetime as well as activating, manning, training, and demobilizing cadre units during wartime.

The final paper in this dissertation analyzes cadre units from a historical perspective. Cadre units have been proposed many times throughout the history of the U.S. Army. These proposals were made for reasons different from those discussed in this dissertation. The final paper analyzes previous cadre proposals in the United States and discusses the similarities and differences of the cadre forces analyzed in this dissertation.

Each of these papers stands by itself and contains its own table of contents and appendices. Together, the insights from these three papers provide a multi-perspective analysis of the tradeoffs involved in moving to a cadre augmented army.

Paper One—A Budgetary Analysis of Cadre

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TABLES

1. INTRODUCTION

The introduction to this dissertation asserted that integrating cadre units into the Army could reduce costs without significantly increasing military risk. However, the introduction says nothing about how much cadre units could reduce costs or how relying on cadre units might affect military risk. The magnitude of the cost savings is important because integrating cadre units into the force requires significant institutional changes and the cost savings must be of significant magnitude to make these changes worthwhile. Measuring military risk is important because relying on a lower readiness force will increase military risk. The tradeoff between cost and military risk is the topic of this paper.

This chapter introduces the reader to cadre units and the metrics, assumptions, and models needed to evaluate them. We begin by discussing how we conceptualize a cadre unit. We then define key terms, make explicit all assumptions, and provide an overview of the model used to evaluate cadre.

1.1—CONCEPTUALIZING A CADRE UNIT

There are a number of different ways that the one can conceptualize a cadre unit. The second paper of this dissertation explores many of these possibilities. In this section, we preview the key issues to provide the reader with a context for the analyses performed in this paper. Cadre units face different issues in peacetime and in wartime so we address these issues separately.

1.1.1—Peacetime Cadre Units

In peacetime, the major concerns regarding cadre units are equipment, structure, and organization. We ignore equipment costs in all calculations performed in this paper due to a lack of data. However, in the worst case, a cadre unit would have a full set of equipment and therefore would have equipment costs no higher than those of an AC unit. In the second paper of this dissertation, we explore options that would allow cadre units to retain less equipment than AC units in peacetime. This would decrease the cost of a cadre augmented force beyond those calculated in this paper.

The essence of cadre is maintaining only leadership in the force and retaining additional junior personnel as needed. Thus, choosing a cadre peacetime structure requires choosing how many and which leaders to retain. In this dissertation, we explore options ranging from retaining all officers and non-commissioned officers (NCOs), which comprise 43 percent of a full-strength unit, to relying on increased promotion rates and activation of senior personnel in the Individual Ready Reserve (IRR) in wartime, which reduces the number of personnel required in peacetime to 13 percent of a full-strength unit. We also explore different possible organizations for cadre units. In all cases, we assume that active officers and NCOs would be rotated through cadre leadership positions as they are through regular staff and line positions. For leaders assigned to cadre units, we consider options ranging from retaining cadre leaders on active duty with their cadre units to retaining leaders in the reserves. The structure and organization of a cadre unit will determine both its cost and its readiness. In our base case analysis, we assume that cadre units retain 25 percent of their personnel during peacetime and that they will be assigned some other duties beyond simply maintaining their cadre unit. CBO (1992) estimated the cost of this type cadre unit to

be about 20 percent of an AC unit.[1] See Chapter's Two through Four of Paper II for a more

complete discussion of these issues.

1.1.2—Wartime Cadre Units

We split the wartime state of a cadre unit into five stages: deliberate, fill, train,

deploy, and demobilize as shown in Figure 1.1.

Figure 1.1—Cadre Wartime Stages
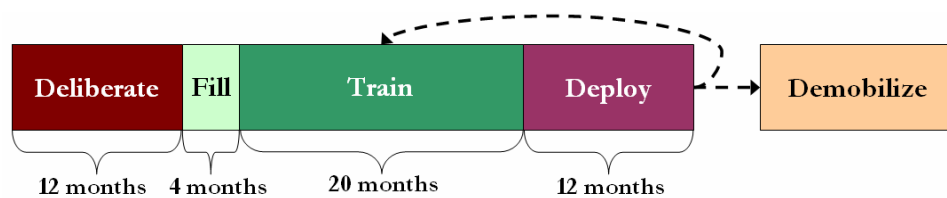
The deliberate period is when national leaders debate whether to activate cadre units.

Activation has a different meaning for cadre units than it does for RC units. Activating an

RC unit means brining its personnel onto active duty and training them. Activating a cadre

unit means filling the unit with junior personnel and training them.[2] In the base case analysis,

we assume that the deliberation process would take about 12 months after the initial

deployment of forces.[3] After it is decided that cadre units should be activated, the next two

stages fill cadre units with junior personnel and train them for deployment. In the base case

analysis, we assume this would take about two years- four months to fill and 20 months to

train. The mobilization period is followed by the deployment period, which we assume lasts

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[1] See discussion of peacetime cost in Section 1.3.2 for more detail.

[2] For all cadre unit types, activation requires increasing end-strength. Other actions required to activate a cadre unit that are dependent on unit type are: increasing promotion rates, activating IRR personnel, increasing equipment production, brining cadre leaders onto active duty, and training cadre leaders.

[3] One might imagine that for military operations with sufficient warning time, the cadre mobilization process could begin even earlier (even before D-day). See Vick et al (2002), p. 57-78, for a good discussion of U.S. experiences with warning time. However, because cadre units are only needed for long wars, it seems fair to assume that decision-makers will be unable to determine whether cadre units are needed until initial forces have been deployed and there is a sense about the type of follow-on operations that might be needed.

one year. After being deployed, a cadre unit either returns to a simplified mobilization stage (without having to recruit and train all new personnel) or moves to the demobilization stage depending on the demand for forces. The demobilization period is the period in which cadre leaders are reassigned to their peacetime tasks and junior personnel are separated.

The major concerns with cadre units during wartime are deliberation, filling, training, and demobilization. The most salient concern with cadre units during wartime is filling-where to get the personnel to fill out cadre units. In the second paper of this dissertation, we consider three options: increased recruiting, activation of individuals from the IRR, and offering bonuses to RC personnel to join a cadre unit. All three options have their drawbacks. Increased recruiting alone is unlikely to meet the wartime demands of cadre units for junior personnel because it is constrained by the supply of individuals willing to enlist.[4] Activating IRR personnel who have just separated from active duty is unpopular and offering bonuses to RC personnel will decrease cost savings from a cadre augmented force. Filling is the factor that appears to most constrain the mobilization of cadre units. In Paper II, we find that training cadre units is not much of a concern because there is enough excess capacity in both the individual and collective training system. Deliberation is more of a concern because there may be a significant delay after the beginning of hostilities before cadre units are activated. The responsibilities for activating cadre units would likely lie with the DoD, but would be dependent upon increased appropriations from Congress. The final issue, demobilization, will require the DoD to decrease recruiting targets and increase first term separation rates. It will take some time after a war is over to demobilize a cadre force

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[4] This depends on the cadre mobilization rate discussed in Section 1.3.4.

and the use of separation bonuses could increase costs. See Chapter Five of Paper II for a more complete discussion of these issues.

1.2—DEFINITIONS

Now that we have provided some context on cadre units, we can lay out the framework for the analyses in this paper. Throughout this paper, we use two metrics to analyze the attractiveness of a cadre augmented force: cost and military risk. This section defines these metrics and the unit of analysis.

1.2.1—Cost

We begin the analyses in this paper by calculating the cost savings from a cadre augmented force. To do this, we utilize two cost measures. Our first cost measure is average long-run annual cost. Average long-run annual cost is defined as the cost of the force averaged over periods of peace and war.[5] This measure is useful because the cost of "expansible" force structures like those including cadre units varies significantly between peacetime and wartime. Our second cost measure is annual peacetime cost. Peacetime cost is defined as the cost of the force when no reserve (cadre or RC) units are mobilized. This metric avoids the difficulties of estimating wartime costs. These difficulties include estimating additional recruiting and training costs for personnel to fill cadre units and the costs of demobilizing cadre units at the end of a war, both of which are ignored in the

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[5] The cost of a force structure in peacetime will generally be lower than in wartime even if we ignore operational costs (logistics, support, etc.) because "reserve" (cadre, RC) units are not mobilized in peacetime. This assumes the force structure includes some kind of "reserve" force; an entirely AC force structure would cost the same in peacetime and wartime under the assumptions made here. See Appendix A for more detail on cost calculations.

analyses in this paper.[6] Appendix A provides detail on these cost metrics and how they are calculated.

1.2.2—Military Risk

There are many definitions of military risk. In this paper, we analyze only a few of these. One definition of military risk is the ability of a force to meet the demand for deployed forces. In a rotational force, as long as the requirement is below some critical level,[7] a force can always be rotated more intensively to meet a larger requirement. Therefore, in this paper our primary metric of military risk is how intensively a force is rotated, which we call force stress. More specifically, we define force stress as the amount of time at home for AC units[8] between deployments while holding the length of deployments constant at one year.[9]

In this paper, we also consider two other measures of military risk: the number of units ready to deploy immediately and the number of units with more than one year at home ready to deploy immediately. While these additional measures are less relevant for rotational wars, we calculate them because, while rotational wars are the focus of this study, the United States also needs to maintain an ability to fight short-warning conflicts. In addition, these measures were standard in analyses of the ability of a force to fight two short-warning simultaneous wars. All measures of military risk are calculated using the Long War

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[6] Both of these additional costs are discussed, but not estimated, in Paper II of this dissertation.

[7] At some point, a high enough requirement will require deploying all units for the duration of a war.

[8] We assume that RC units are mobilized at most for one year in six.

[9] DoD (2004) lists "frequency, percent of inventory used, and duration" as the three key indicators of force stress. Our analyses hold constant AC deployment duration at one year and use frequency of deployments as our stress measure. Together, frequency and duration dictate the percent of the inventory used at any given time.

Assignment Model (LWAM) described later in this chapter and in more detail in Appendix B.

1.2.3—Unit of Analysis

The unit of analysis for all of the analyses in this dissertation is the Brigade Combat Team (BCT). We chose this unit because it is the type of unit for which there is the most publicly available information and because it is the primary unit of action for Army combat forces.

1.3—ASSUMPTIONS

Now that we have defined our metrics, we can describe the assumptions needed to calculate cost and military risk. These assumptions include: the frequency of future wars, the peacetime cost of each force, the wartime rotation guidance for each force (and the willingness of the DoD to deviate from this while cadre units mobilize), and the readiness of each force. Table 1.1 summarizes the assumptions we make in this paper and the following subsections describe them in more detail. Each of these assumptions is relaxed incrementally in Chapters Three through Seven of this paper.

Table 1.1—Base Assumptions

Parameter	AC	RC	Cadre	Chapter(s)
Frequency of Wars		33 %		3
Peacetime Cost	1.00	0.28	0.20	4
Rotation Guidance (Deviation)	1:2 (1:1)	1:5 (none)	1:2 (none)	5 & 6
Readiness (months to deploy, rate)	0	4	36[10], 3 BCTs/yr	7

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[10] This is the amount of time, from the beginning of a war, that it takes for the first cadre unit to be ready for deployment. This includes a 12 month deliberation delay, 4 months to recruit, and 20 months to train for deployment (see readiness discussion that follows).

1.3.1—Frequency of War

The difference between wartime and peacetime in the analyses in this paper is the need for "reserve" units (RC, cadre). The frequency of war measures the percentage of time that RC and cadre units are needed. We distinguish here between need and mobilization because RC and cadre units are not mobilized for all years of a war. Cadre units mobilize in wartime following a delay, after which they are mobilized for the remainder of the war. RC units only mobilize one year in six during wartime. Estimating how frequently reserve forces would be needed requires thinking carefully about when RC and cadre units would be mobilized. In this paper, we assume that these units are mobilized only if the requirement for deployed forces surges for a sustained period of time above the level at which the AC can sustain when rotated at 1:2.[11] If the requirement surges only for a short period (less than one year), AC units in the ARFORGEN "ready" pool can surge to meet the requirement without the need to mobilize reserve units. However, if the requirement stays at a higher level beyond one year, RC and cadre units would be needed and mobilized. It is likely that cadre units will be mobilized for some wars in which they are not deployed and that cadre units will not be immediately demobilized at the end of each war. While our baseline frequency of war estimate includes both short and long wars, our analysis does not include costs for demobilization and therefore overestimates the cost savings from a cadre augmented force.[12]

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[11] For instance, a force with 48 AC BCTs can sustain 16 deployed BCTs at 1:2. If the requirement for deployed forces surged above 16 BCTs for more than one year then RC and cadre BCTs would be mobilized.

[12] Paper II finds that the cost of separation bonuses could reduce the cost savings from a cadre augmented force by 15 percent. The cost savings could be reduced even further if the demobilization process takes many years.

We use 33 percent as our baseline estimate for the frequency of wars. This estimate is from Doyle and Gotz (2007) which captures all wars (both long and short) occurring since WWII. Doyle and Gotz estimate a Markov transition matrix for wars occurring since World War II. Although it is impossible to accurately predict the frequency of future wars, this estimate provides an external, historically grounded, estimate that can serve as the base case. Chapter Three examines the sensitivity of the results in this paper to assumptions about the frequency of future wars.

1.3.2—Peacetime Cost

For RC units, we use the peacetime cost estimate from Jaffe (2006). This is the most recent publicly available estimate and is based on data provided by the U.S. Army. It is also consistent with our own calculations and a number of previous estimates.[13] The peacetime cost of a cadre unit will depend on the design and organization of the cadre unit.[14] The larger the size of the "cadre" (leaders retained in peacetime), the more expensive the cadre unit will be. A 1992 report from the Congressional Budget Office (CBO) discusses this issue:

> "The results … suggest that the cost to operate cadre units in the Army would vary substantially depending on the design of the cadre unit. A cadre unit with minimal manning—about 4 percent to 5 percent of a normal unit's total manning—would cost only about 15 percent as much to operate as a corresponding selected reserve unit."

> - CBO (1992)

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[13] See Section A.2.2 for a full discussion of previous estimates about the relative cost of the RC.

[14] See Paper II for a discussion of cadre unit designs and their implications for the peacetime cost of a cadre unit.

Using the RC cost relative estimate from Jaffe (2006), the relative cost of a cadre unit

retaining four to five percent of its personnel in peacetime would be about four percent

(0.15*0.28=0.04). However, the analyses in Paper II of this dissertation show that many

more officers and NCOs might need to be retained in a cadre unit given the grade structure

of BCTs. If cadre units maintain a greater number of full-time personnel in peacetime, then

the relative cost of a cadre unit will increase. The CBO report elaborates:

> "But a cadre unit manned in peacetime with enough active personnel to provide 25
>
> percent of normal manning would entail about 70 percent of the costs of a selected
>
> reserve unit."

- CBO (1992)

Using this estimate, we calculate the cost of a cadre unit relative to an AC unit to be about

20 percent (0.7*0.28=0.2). We use this cost estimate as our base case in this paper. Chapter

Four explores the sensitivity of cost savings from cadre to cadre peacetime costs. The

second paper of this dissertation discusses cadre unit designs and their cost differences in

more depth.

1.3.3—Rotation Guidance and Deviation

The analyses in this paper assume that the DoD will try to adhere to the 2007

rotation guidance (not actual practice, which is 1:1 or more for the actives) in the future.

This means that the DoD will try to provide AC units with two years at home for every one

deployed and RC units with five years at home for every one deployed. We assume that

cadre units will be deployed like AC units once they are mobilized. Chapter Six explores the

sensitivity of the results derived in Chapter Two to assumptions about future rotation

guidance.

In a cadre augmented force, some AC or RC units will need to break rotation guidance in the period before cadre units are ready to deploy. In this paper, we assume that the DoD would be willing to stress some AC units but no RC units during this time. In our baseline calculations, we assume that the DoD is willing to allow some AC units to deploy with as little as one year at home during the period while cadre units mobilize, but not thereafter. In Chapter Five, we find that the DoD must be willing to allow some AC units to deploy with as little as one year at home while cadre units mobilize in order for a cadre augmented force to reduce costs. If the DoD is unwilling to do this, a cadre augmented force is much less attractive. We note that the DoD has used AC forces even more intensively than this in pursuit of the Global War on Terrorism (e.g., 2007 and 2008 when Army units deployed for 15 months after having only 12 months at home).[15]

1.3.4—Readiness

In the introduction to this dissertation, we stated that RC units are ready to deploy only after four months of post-mobilization training. This estimate was based on an analysis of post-mobilization training for units deploying to Iraq and Afghanistan. We know much less about the post-mobilization training that would be required by cadre units. There are two components to cadre readiness: mobilization delay (how soon the first cadre unit is ready) and mobilization rate (how quickly cadre units are ready thereafter). As our base case, we assume that the first cadre unit would be ready to deploy 36 months after the beginning of a war (mobilization delay) and that three cadre units would be ready every year thereafter (mobilization rate). This assumption is based on the cadre mobilization timeline shown in Figure 1.2.

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[15] Garamone (2007); Korb, Rundlet, and Bergman (2007)

Figure 1.2—Cadre Mobilization Timeline
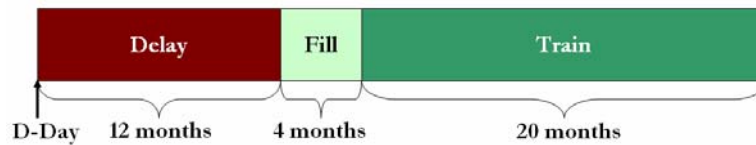
As discussed earlier, we assume that there would be a one-year "decisional delay" after the beginning of the war (D-day) until cadre units are prepared for deployment.[16] After this delay, we assume it would take four months to fill and 20 months to train one BCT for a total delay of 36 months until the first cadre unit is ready to deploy. In this paper, we assume that cadre units are filled by increasing recruiting in wartime. Therefore, every four months we fill one cadre unit and begin to fill the next one. Under this assumption, three new BCTs would be ready to deploy each year.[17] Other methods of filling cadre units such as IRR activation and offering RC personnel bonuses to serve in cadre units would create a different dynamic. In the case of IRR activation, cadre units would be filled immediately since IRR personnel can be activated all at once.[18] We find in Paper II of this dissertation that the IRR could provide about 44,000 junior personnel in wartime. This is large enough to fill out about seven cadre BCTs. Any larger cadre force would also have to rely on increased recruiting. In the case of RC bonuses, cadre units could also be filled immediately because bonuses could be offered immediately after activation of the cadre unit. Whether or not these units would also need to rely on increased recruiting would depend on the number of junior reservists who would accept a bonus to serve in cadre units.

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[16] Recent American experience suggests that after a build-up and intensive war phase of three to nine months, some conflicts roll over to stabilization (e.g., Afghanistan, Iraq, Vietnam, Korea) and others result in simple withdrawal of almost all forces (e.g., First Gulf War, Granada, Panama). This one year decisional delay allows delaying the decision as to whether to activate cadre units until the occupation/stabilization decision is made.

[17] See Paper II for a discussion of the feasibility of increasing end-strength to fill out cadre units mobilizing at a rate of three BCTs per year.

[18] However, IRR refresher training capacity may constrain this number.

1.4—MODELING

In order to calculate the attractiveness of a cadre augmented force, we built a model called the Long War Assignment Model (LWAM). This section provides a brief overview of the model and discusses two key assumptions. Appendix B describes the model in more detail.

1.4.1—The Long War Assignment Model (LWAM)

The Long War Assignment Model (LWAM) simulates the deployment of forces over time to meet a given demand. It takes as inputs all of the parameters discussed in the previous section (summarized in Table 1.1) plus a time series demand for forces and an initial force structure. The model then simulates the deployment of forces subject to the specified force use constraints to meet the demand over time. If the force cannot meet the requirement in any period, the model increases the size of the RC and starts over. If the force is able to meet the requirement, the model calculates the cost of the force and the stress on the AC over the course of a war. These metrics are used to analyze the attractiveness of a cadre augmented force throughout this paper. This process is summarized in Figure 1.3.

Figure 1.3—Overview of the Long War Assignment Model
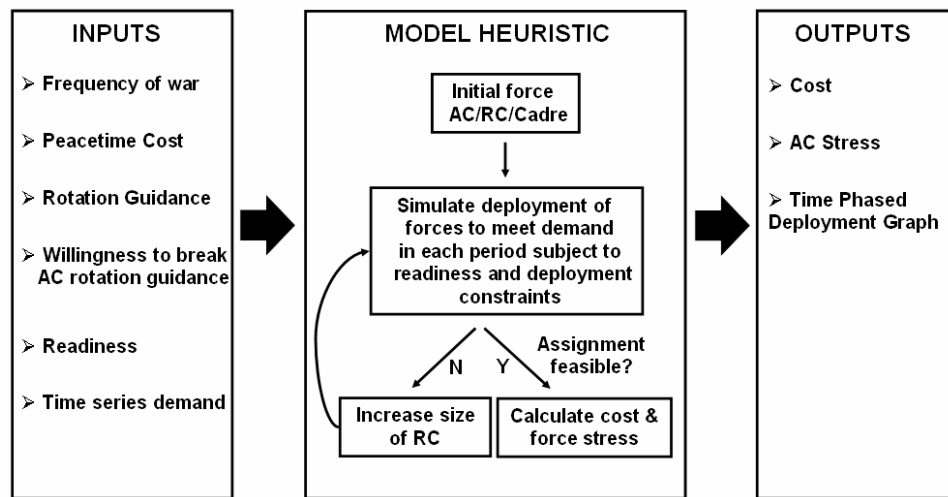
1.4.2—Length of Wars

The LWAM requires the user to make an assumption about the length of future wars. The length/number of wars and time horizon together determine the frequency of wars. For instance, a war frequency of 33% could be two five-year wars or one ten-year war over a thirty-year period. In all of the analyses in this paper we assume that there will be one ten-year war every thirty years.[19] This is long enough that cadre units will be deployed more than once. If wars are shorter than this, cadre units are of little use because we could fight these wars by using the AC and RC a little more intensively without placing any long-term stress on the force.

Only some of the results presented in this paper are sensitive to the length of war. The risk measures used in this paper are not sensitive to the length of war because a cadre

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[19] This is slightly longer than the average length of war derived from the Markov transition matrix provided by Doyle and Gotz (2007), which was six years. Given the shift towards long duration operations (counter-insurgency, nation-building, etc.), it is possible that future wars will be longer. The Defense Science Board (DSB) states that an average stabilization and reconstruction operations "typically last for 5 to 8 years, significantly longer than typical combat operations." [DSB (2004)] While smaller operations may last 5 to 8 years, it is likely that larger operations would last slightly longer. Some expect operations in Iraq to last more than ten years. [Tiron (2008), Tyson (2008)]

augmented force only increases risk in the early periods of a war while cadre units are mobilizing. The cost savings from cadre are sensitive to the length of war. The longer a war is, the larger the fraction of time that cadre units are mobilized. We explore this sensitivity in Chapter Three by holding constant the time horizon and varying the length of war.

1.4.3—Deterministic Force Demand

The LWAM also assumes that wars occur according to a deterministic process. We attempted to model cadre units stochastically using the RAND SLAM Model[20] (see Appendix C) but model limitations prevented us from utilizing this model to perform all of the analyses in this paper. For the same force structure alternatives analyzed in this paper, we found that the risk calculated by the stochastic model is higher than that calculated by the deterministic model. We attribute part of the increase to the fact that some wars will occur with little gap in a stochastic model while all wars will occur with twenty years in between in the deterministic model. AC units experience significant stress in back-to-back wars because cadre units are demobilized and must go through the full mobilization process again before they can be deployed. Therefore, the stress calculated in this paper may be slightly under-estimated.[21]

1.5—OUTLINE

The remainder of this paper analyzes the attractiveness of a cadre augmented force in terms of cost and military risk. The second chapter calculates the cost and risk from a cadre augmented force under a baseline set of assumptions. Chapters Three through Seven

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[20] Klerman et al (2008)

[21] We do not attribute the entire increase in risk to the stochastic process because there are other significant modeling differences that could also be causing these discrepancies. See Appendix C for more detail.

explore the sensitivity of the results. Chapter Eight summarizes the results and provides

further discussion of some of the key issues and assumptions.

2.   CADRE COST/RISK TRADEOFFS

This chapter calculates the changes in costs and military risk from moving to a cadre augmented force. We consider a number of different cadre augmented force structures to provide a broad picture of the cost-risk tradeoffs from a cadre augmented force. This chapter relies upon the assumptions outlined in Chapter One. These assumptions are relaxed incrementally in Chapters Three through Seven.

The first section of this chapter calculates the difference in cost and risk from increasing the size of the Army with cadre units instead of AC units. The second section calculates the change in annual cost and risk from altering the mix of the Army as it will be in 2011 to include cadre units. The third section considers alternative measures of military risk. The final section calculates the size of the cost savings from cadre relative to the total cost of the Army and presents other reform proposals that achieve cost savings of the same magnitude as those from a cadre force.

2.1—EXPANDING THE FORCE

In January of 2007, President George W. Bush announced he was going to increase the size of the active Army by six BCTs.[22] The purpose of this expansion was to increase dwell time[23] for units deploying in support of the Global War on Terror (GWOT).[24] The

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[22] Sherman and Roque (2007), Department of Defense (2007b,c)

[23] Dwell time is used throughout this dissertation to describe the amount of time a unit is home between deployments. This is a term commonly used by the Army.

[24] "The extra 65,000 soldiers and 27,000 Marines, due to be added by 2012, will increase time at home for units between deployments … Army Gen. Peter J. Schoomaker, Army Chief of Staff, and Marine Gen. James T. Conway, commandant of the Marine Corps, told the Senate Armed Services Committee." [Wood (2007)]

increase of six BCTs will not be complete until 2011.[25] If operations in Iraq and Afghanistan last through 2011, then creating AC BCTs will achieve this goal. However, if a significant drawdown of deployed forces begins before 2011, most of these new units will be too late.[26] In this case, these new forces would serve as a rotation base for future wars.[27] In this case, the DoD might consider building new cadre units rather than AC units. Even if this is not the case, when a drawdown does begin, it is worth considering transforming these additional AC units to cadre units. The first subsection explores this possibility. Some policy experts argue that the size of the AC force should be expanded beyond six BCTs.[28] These proposals focus primarily on building a larger rotation base. Therefore, it is also worth considering whether creating these new units as cadre units could reduce annual costs. The second subsection analyzes this possibility.

2.1.1—Rethinking the 2007 Expansion

After the increase in the size of the active force is completed in 2011, the Army will have six additional AC BCTs. This force, which we call the *2011* force, will contain 48 AC BCTs and 28 RC BCTs. When these new units are used according to the rotation guidance

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[25] Initially, the increase was supposed to occur over five years ending in 2012. As of late-2007, the increase was planned to be completed by the end of 2011, one year earlier. [Cloud (2007)]

[26] Many observers doubt that there will remain as substantial a presence of U.S. forces in Iraq and Afghanistan by the time these new units are ready to deploy. Betts (2007) writes: "Had the additional forces been available earlier, to be fielded as needed, the increases might have made sense. But it will take several years to recruit, train, organize, and deploy additional ground combat brigades, by which time the United States will probably have withdrawn the bulk of its forces from Iraq." Similarly, the International Institute for Strategic Studies writes: "few officials speak of very large US troop deployments to Iraq even two or three years ahead; and many politicians are calling for a drawdown in Iraq starting next year. Hence the immediate and most publicized rationale for the increase may decline as ground forces grow." [IISS (2007)] Also see: Bender (2007a), Adams (2007a,b), Conetta (2007a), Friedman (2007), and Arkin (2007).

[27] The International Institute for Strategic Studies writes: "the announced intention to expand them [the ground forces] is best seen not as 'relief' for forces rotating through Iraq and Afghanistan, but rather as a sensible way of hedging against an uncertain- but very possibly dangerous-future." [IISS (2007)] Also see: Korb and Bergmann (2007), p. 22.

[28] See footnotes in section 2.1.2 for references to these proposals.

stated as of 2007, they provide two additional BCTs deployed continuously. To sustain

rotations in future wars, this same increase could be achieved by adding the same number of

cadre units.[29] We call this force the *+6 Cadre* force.[30]

We calculate two types of cost savings from expanding the force with cadre rather

than AC BCTs: average long-run and peacetime costs. The average long-run and peacetime

costs of adding six new AC BCTs are the same, about $7 billion per year[31] because AC units

have the same cost during peacetime and wartime.[32] If we assume that wars occur 33 percent

of the time, increasing the size of the force by six cadre BCTs rather than six AC BCTs

reduces average long-run annual costs by about $4 billion.[33] Adding six cadre BCTs instead

of six AC BCTs reduces peacetime costs by about $5 billion. Cadre units provide larger cost

savings in peacetime because we assume they are equivalent to, and therefore cost the same

as, AC units when they are mobilized during wartime. This analysis assumes that combat

units *and* their associated combat support / combat service support units are maintained in

cadre status during peacetime. We explore the sensitivity of this result in the following

chapters.

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[29] This assumes cadre units are used according to the same rotation guidance as AC units when mobilized. Since members of cadre units would be full time soldiers, it is likely that they would be utilized like AC units.
[30] The *+6 Cadre* force contains 42 AC BCTs, 28 RC BCTs and 6 cadre BCTs.
[31] This assumes the average annual cost of an active duty soldier is $100,000 per year. This is consistent with the estimates in CBO (2007a). Given this per soldier cost, the 65,000 (six BCT) increase in Army end-strength would cost an additional $7 billion per year. This is slightly lower than the projected sum of personnel and operations cost of the force increase estimated by the Army in 2008 ($8.2 billion). [GAO (2008), p.4] Other public sources have estimated the annual cost of increasing the size of the force at $1.5 billion per 10,000 personnel [New York Times Editorial Board (2006)], and $1.2 billion per 10,000 personnel [Jaffe (2006), and IISS (2007)]. Using these alternative estimates, the magnitude of the cost savings from a cadre augmented force calculated in this paper would be larger. See Appendix A for more detail.
[32] AC units are always mobilized, unlike RC units, which are only mobilized for deployments.
[33] Calculations are described in Appendix A.

This analysis assumes that the DoD would be willing to allow some AC units to break rotation guidance while cadre units mobilize.[34] We measure military risk for a rotational force as the percentage of AC units that deployed with less than two years at home.[35] We consider other measures of risk in Section 2.3. Figure 2.1 depicts our primary measure of risk by comparing the percentage of all AC units deployed with less than two years at home for the *2011* force versus the *+6 Cadre* force.[36]

Figure 2.1—Comparison of AC Stress between *2011* and *+6 Cadre* Force
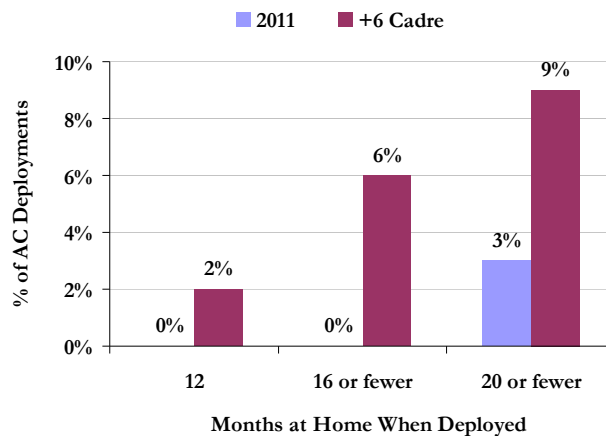
The *+6 Cadre* force increases AC stress relative to the *2011* force. While only three percent of AC units in the *2011* force are deployed with less than two years at home, nine percent of AC units in the *+6 Cadre* force are deployed with less than two years at home. Moreover, no AC unit in the *2011* force is deployed with 16 or fewer months at home while

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[34] More specifically, the analysis assumes that DoD would be willing to allow some AC units to deploy with less than two years, but no less than one year at home between deployments while cadre units mobilize. This is required because a cadre augmented force with just AC and RC units cannot meet the demand for deployed forces while cadre units are mobilizing without either decreasing dwell time or increasing deployment length. Because we assume that RC units are strictly bound to rotation guidance (1:5), AC rotation guidance must be broken in the period while cadre units mobilize.

[35] Up to a point, a rotational force can always meet a larger requirement by rotating units more frequently.

[36] This analysis is performed using the Long War Assignment Model (LWAM) described in Appendix B. It assumes that wars last on average ten years and occur 33% of the time. The calculation of force stress is discussed in Appendix A.

six percent of AC units in *+6 Cadre* force are deployed with 16 or fewer months at home

with two percent deployed with exactly 12 months at home. Although the cadre augmented

force increases stress on the AC, compared to the percentage of AC units deployed with less

than two years at home to Iraq and Afghanistan (nearly one-hundred percent during

wartime, 33 percent overall assuming the same frequency of war),[37] this increase in stress is

negligible and each unit gets at least a full year at home between deployments.[38] However,

whether this increase in stress in future wars is acceptable to achieve the cost savings from a

cadre force is unclear. The analysis in this paper only goes as far as to present the tradeoffs.

2.1.2—Rethinking Further Expansions

Many experts and leaders have advocated an Army even larger than that now being

planned for by the DoD.[39] These individuals have argued that the six AC BCT expansion is

not enough to meet the future national security needs of the United States. One group

argues that the Army needs an additional 100,000 troops (~9 BCTs)[40]; another argues that

we need 200,000 more troops (~18 BCTs)[41] to return to Cold War force levels.[42] Since these

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[37] As of mid-2007 almost 100% of AC BCTs are redeployed after 12 months at home. [Korb, Rundlet, and Bergman (2007)]. When measured over periods of peace and war when wars occur 33 percent of the time, 33 percent of AC units are deployed with 12 months at home.

[38] On August 2, 2007 the U.S. House of Representatives Passed *H.R. 3159: Ensuring Military Readiness Through Stability and Predictability Deployment Policy Act of 2007*. This bill mandated "minimum periods of rest and recuperation for units and members of the regular and reserve components of the Armed Forces between deployments for Operation Iraqi Freedom or Operation Enduring Freedom." The minimum period of rest for an AC unit is equal to the length of a unit's last deployment. If we assume AC deployments are one year long then this bill mandates at minimum one year of rest. The minimum period of rest for an RC unit is equal to three times the length of a unit's last deployment, which would be about three years. See: U.S. House of Representatives- House Armed Services Committee (2007) and Maze (2007). This bill was not enacted into law as of early 2008.

[39] Bacevich (2007), Korb and Duggan (2007), Kagan and O'Hanlon (2007), Talent (2007), USA Today Editorial Board (2007), New York Times Editorial Board (2006).

[40] Luo (2007), Bay (2007), Dixon and Santora (2007), Goure and Thompson (2006)

[41] Donnelly and Kagan (2008b) argue that the Army must expand by about 18 AC BCTs. This is based on "the need to conduct a sustained, large-scale stabilization campaign," which they call an "Iraq-sized block" of about 18 AC BCTs and "several less-demanding reconstruction missions simultaneously," which they call

increases aim to provide a larger rotation base for the future, we might consider adding cadre BCTs instead of AC BCTs.

We find that increasing the size of the force with nine cadre BCTs rather than nine AC BCTs would save $6 billion annually averaged over periods of peace and war and $8 billion annually during peacetime. We find that increasing the size of the force with 18 cadre BCTs rather than 18 AC BCTs would save $12 billion annually averaged over periods of peace and war and $16 billion annually during peacetime. For these larger force expansions, a cadre augmented force also increases stress on the force relative to the larger AC forces.[43] Figure 2.2 compares the stress placed on the AC for expansions of nine and 18 BCTs.

"Afghanistan-sized' blocks" of three to four AC BCTs. [Donnelly and Kagan (2008b), p. 114] Their overall force structure proposal is based on the assumption that AC BCTs would be rotated at 1:2. Therefore, about 60 AC BCTs would be required. Also see: Donnelly and Kagan (2008a), Donnelly (2007a,b); Donnelly, Kagan and Schmitt (2007); Lightman and Talev (2007)

[42] The number of additional BCTs for the 100,000 and 200,000 troop expansions was calculated using the ratio of troops to BCTs from the 2007 expansion. The 2007 expansion builds six BCTs from 65,000 personnel, for a ratio of about 11,000 personnel per BCT. Therefore, an increase of 100,000 personnel would create about nine BCTs and an increase of 200,000 personnel would create about 18 BCTs. The number of personnel actually assigned to a BCT is only around 4,000; the additional personnel are assigned to non-combat units such as Combat Support (CS), Combat Service Support (CSS), echelon above division (EAD), and to the institutional army (TDA). These support personnel are added in proportion to combat personnel.

[43] These larger expansions also require high mobilization rates in order for all cadre units to be deployed over the course of a ten-year war. These rates are not achievable by relying solely on increased recruiting. See Chapter Five of Paper II for more detail.

Figure 2.2—Comparison of AC Stress for Larger Expansions
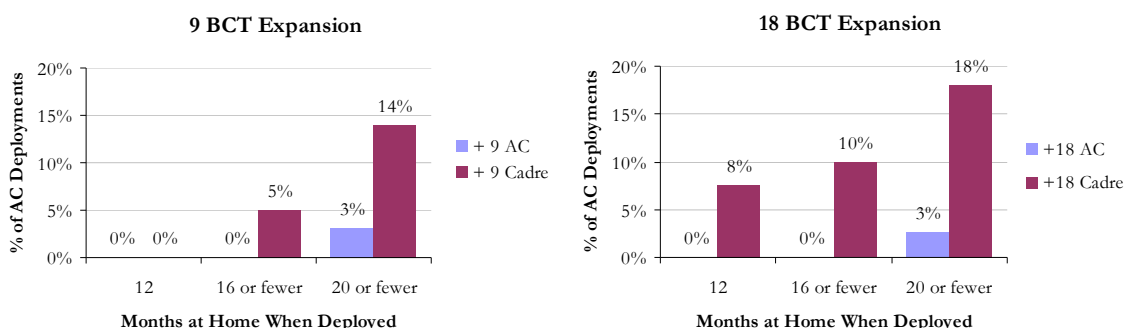
For the nine BCT expansion, the cadre augmented force deploys 14 percent of units with less than two years at home while the expanded AC force deploys only three percent with less than two years at home. The expanded AC force deploys no unit with 16 or fewer months at home, while the cadre force deploys five percent with 16 months at home but none with 12 months at home. For the 18 BCT expansion, the expanded AC force deploys three percent of units with less than two years at home and none with 16 or fewer months at home. The expanded cadre force deploys 18 percent of units with less than two years at home with ten and eight percent deployed with 16 or fewer and 12 months at home between deployments. As we observed for the six BCT expansion, there is additional stress from relying on a cadre augmented force. However, this stress is small compared to the percentage of AC units deployed to Iraq and Afghanistan with less than two years at home as of 2008. All AC units also receive at least one year at home between deployments while cadre units are mobilizing. Whether this additional stress is acceptable in order to derive the cost savings from cadre depends is unclear. This section only goes as far as to present the tradeoffs between cost and stress.

We have seen that using cadre instead of AC units to grow the force can provide significant cost savings. However, this also increases the amount of stress placed on the AC.

The magnitude of the cost savings and increases in military risk increase with the size of the expansion.

2.2—CHANGING THE MIX OF THE FORCE

In the previous section, we assumed that the future army will be contain at least as many AC and RC BCTs as there are in the *2011* force. The *2011* force contains 48 AC BCTs and 28 RC BCTs. When used according to DoD rotation guidance, this force can sustain 19 continuously deployed BCTs. In this section, we calculate the cost savings from *replacing* AC *and* RC BCTs in the *2011* force with cadre BCTs while maintaining the ability to sustain the same number of deployed units. Figure 2.3 visually depicts how this analysis differs from the previous section.

Figure 2.3—Changing the Force Mix
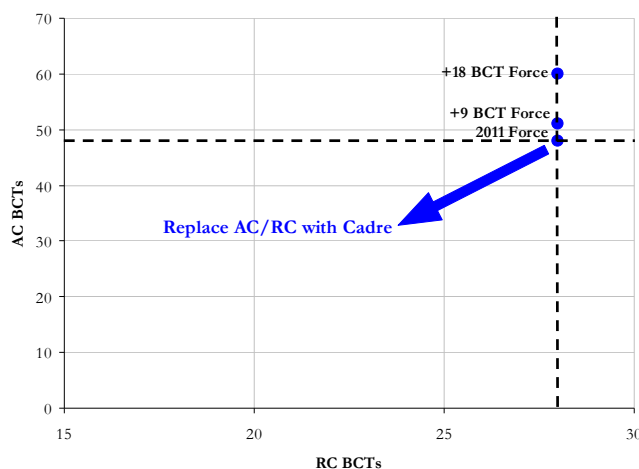
To alter the mix of the *2011* force, we must first determine how many AC and RC units we could replace with cadre units. In order to do this, we must establish the minimum number of AC and RC units required in the force. For the AC, we will size the active force to meet the requirements of two simultaneous wars, which remains a key tenet of force

planning. Throughout the 1990s, it was assumed that each Major Regional Conflict (MRC) would require four to five active Army divisions.[44] The Army maintained about ten active Army divisions during the 1990s in order to be able to fight two simultaneous MRCs. If we assume that each division included three brigades, then a minimum of 30 brigades are needed to meet the requirements of two simultaneous MRCs. However, some would argue that this is too small an active force because BCTs are smaller than the old divisional brigades.[45] Therefore, we consider an active force with 35 AC BCTs.[46] We trade 13 AC BCTs from the *2011* force for 13 cadre BCTs without any loss of ability to fight two nearly simultaneous MRCs.[47] We find that trading 13 AC BCTs for 13 cadre BCTs would save about $9 billion annually averaged over periods of peace and war and $11 billion annually during peacetime.

After replacing AC BCTs with cadre BCTs, we consider replacing RC BCTs with cadre BCTs. This requires making an assumption about the minimum number of RC BCTs required in the force. This is a more difficult question than for AC BCTs because there is little historical guidance. RC BCTs have important homeland security roles, which make it difficult to reduce the size of the RC. However, some would argue that less expensive non-combat forces (Combat Support / Combat Service Support) could perform homeland

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[44] Aspin (1993)

[45] Divisional brigades had three maneuver battalions while BCTs only have two. [Donnelly and Kagan (2008b), p. 126]

[46] A cadre augmented force with less than 35 AC BCTs also cannot meet deployment requirements without deploying AC BCTs with less than one year at home between deployments.

[47] This assumes that BCTs are equivalent in effectiveness to the brigades maintained in the old divisional structure of the Army even though they have fewer personnel per unit. The Army, among others [Scheftick (2004)], argues that the new BCTs will be as effective as the larger divisional brigades because of better C4ISR. To demonstrate this point, the Army carried out "force design analyses in which the two-battalion version of the brigade combat team proved roughly equal to a current divisional brigade. Analysts compared the two models in offensive scenarios that pitted each against a capable enemy under various terrain." [U.S. Army Training and Doctrine Command (2004)]. Others argue the new BCTs will be less effective [Grossman (2006)] especially for counterinsurgency and stabilization operations [CRS (2006a), Watson (2005)].

security duties. Therefore, we might be able to reduce the size of the RC combat force.[48] In

addition, throughout the 1990s, only about 15 RC combat brigades were explicitly utilized in

the war plans as Enhanced Separate Brigades (ESBs).[49] Given this, we might be able to trade

nine RC BCTs for three cadre BCTs while still maintaining enough forces for homeland

security.[50] Averaged over periods of peace and war, maintaining nine RC BCTs costs $3.1

billion annually while maintaining three cadre BCT costs only about $1.3 billion per year.

Therefore trading nine RC BCTs for three cadre BCTs saves about $1.8 billion annually

averaged over periods of peace and war.[51] Trading nine RC BCTs for three cadre BCTs

would reduce annual peacetime costs $2.0 billion. If nine RC BCTs were replaced with three

cadre BCTS in addition to replacing 13 AC BCTs with 13 cadre BCTs, the average long-run

cost savings would be about $11 billion per year while the peacetime cost savings would be

about $13 billion per year as shown in Table 2.1. We call this force the *CadreMix* force. This

force can meet the requirements of two simultaneous MRCs, meet homeland security needs,

and sustain the same rotation as the *2011* force while significantly reducing annual costs

both averaged over periods of peace and war and in peacetime.

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[48] Davis et al (2004) and Davis et al (2007) argue that the National Guard should be tasked with homeland security by organizing ten regional Civil Support Battalions (CSBs). These ten battalions would only require a total of about 9,000 personnel, the equivalent of about three BCTs. Under ARFORGEN, National Guard units would rotate through CSB mission preparation. This would provide a rapid reaction force supplemented by a large reserve for homeland security missions. If three BCT equivalent units are needed at all times, the National Guard would need exactly 18 BCTs for homeland security. However, it is likely the requirement for combat units will be lower because a CSB requires mainly Combat Support and Combat Service Support personnel.
[49] Korb and Duggan (2007), Gilmore (2007), CBO (1997).
[50] Brown et al (1995) conclude that homeland security missions should not determine force structure at all: "Federal mission requirements have been and are the primary driver of National Guard force structure. All things considered, we found no compelling reason to suggest that the National Guard structure should be based in whole or in part on potential state disaster or emergency response requirements." [Brown et al (1995), p. xxi]. However, below a certain level homeland security missions do become a binding constraint on National Guard force structure. We assume that this threshold occurs below 19 BCTs.
[51] Appendix A shows how we calculate the cost savings from replacing RC units with cadre units.

Table 2.1—Cost Savings from *CadreMix* Relative to *2011* Force

Force	AC BCTs	RC BCTs	Cadre BCTs	Deployed BCTs	Average Long-Run Cost Savings	Peacetime Cost Savings
2011	48	28	0	19	-	-
CadreMix	35	19	16	19	$11 billion	$13 billion

As we did in the previous section, we assume that the DoD is willing to deploy some AC units with less than two years at home while cadre units mobilize. Figure 2.4 compares the percentage of all AC units deployed with less than two years at home between the *2011* force and the *CadreMix* force.

Figure 2.4—Comparison of AC Stress between *2011* and *CadreMix* Force
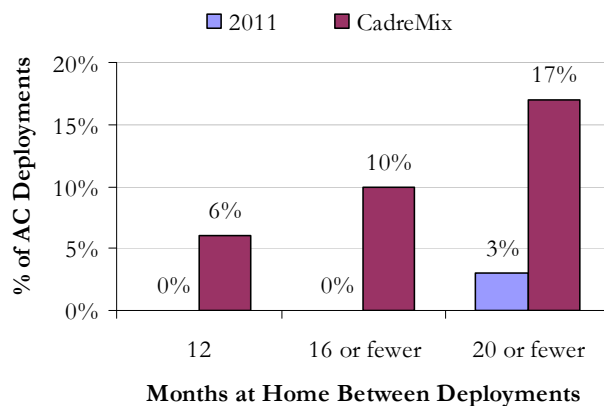
The *CadreMix* force increases stress on the AC compared to the *2011* force. While only three percent of AC units in the *2011* force are deployed with less than two years at home, 17 percent of AC units in the *CadreMix* force are deployed with less than two years at home. Additionally, the *2011* force deploys no unit with 16 or fewer months at home while the *CadreMix* force deploys ten percent of units with 16 or fewer months at home and six percent with 12 months at home between deployments. Again, compared to the stress observed for deployments to Iraq and Afghanistan, the additional stress from a cadre augmented force is small. However, whether this additional stress would be acceptable is a

decision for the DoD. Overall, this cadre augmented force reduces annual costs by $11

billion averaged over periods of peace and war and $13 billion in peacetime but increases

military risk as measured by deviation from rotation guidance.

In this chapter, we calculated the cost savings from four different cadre augmented

forces. Each of these cadre forces is compared against a different baseline force. Table 2.2

shows the structure of each cadre augmented force, its baseline, and the steady-state number

of units each can provide when used according to rotation guidance.

Table 2.2—Cadre Force Structure Alternatives and Baselines

	Baseline			*Cadre Augmented*			*Steady-*
	AC	**RC**	**Cadre**	**AC**	**RC**	**Cadre**	*State*
+6 Cadre	48	28	0	42	28	6	19
+9 Cadre	51	28	0	42	28	6	20
+18 Cadre	60	28	0	42	28	18	23
CadreMix	48	28	0	35	19	16	19

2.3—OTHER MEASURES OF MILITARY RISK

Thus far, we have measured military risk as AC deviation from rotation guidance.

However, other measures of military risk are also important. One of these measures, which

was commonly used during the Cold War, is the number of BCTs that would be available to

deploy immediately at the onset of hostilities. During the Cold War, the force was sized so

there would be enough BCTs available to fight two simultaneous wars. As discussed in the

introduction, only AC BCTs are ready to deploy immediately. Therefore, as another measure

of military risk we calculated the number of AC BCTs available for deployment over the

course of a ten-year war. We began by assuming that all AC BCTs that were not deployed

would be available for deployment. Figure 2.5 compares the number of AC BCTs available

to deploy over the course of a ten-year war in the baseline and cadre forces for each of the
alternatives we analyzed in this chapter.[52]

Figure 2.5—Comparison of AC BCTs Available
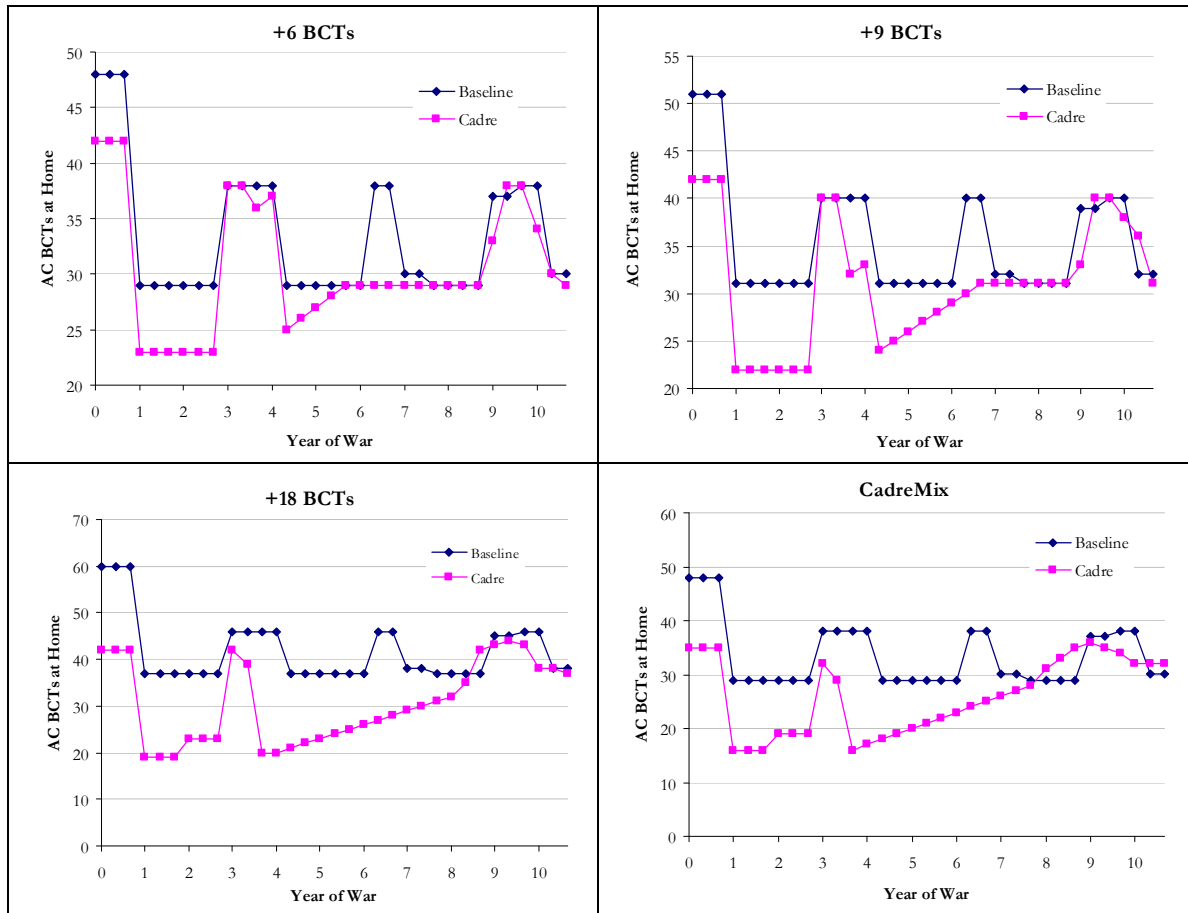
For all of the forces, we can see that moving to a cadre augmented force reduces the
number of AC BCTs that are available for deployment. This is because all of the cadre
augmented forces analyzed in this paper replace some AC units with cadre units. Year 0
represents peacetime when we assume no AC units are deployed.[53] For the six, nine, and 18

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[52] Calculated using the Long War Assignment Model (LWAM). See Appendix B for more detail.

[53] This is a simplifying assumption. In reality, AC units will be deployed to meet forward presence
requirements. However, these will have exactly the same impact on the baseline and cadre forces. A peacetime
requirement will simply reduce the number of AC units available in year zero by the size of the peacetime

BCT expansions, the number of AC units available in peacetime in the baseline forces are 48, 51, and 60 while the cadre augmented forces all have 42 AC BCTs available. The *CadreMix* baseline force has 48 available BCTs in peacetime while the *CadreMix* force has only 35 BCTs. We argued in the previous section that this was still enough to meet the requirements of two MRCs.[54]

During the first eight years of a war, each of the cadre augmented forces has fewer AC BCTs available in nearly every year compared to the baseline non-cadre forces. These differences are larger for the larger cadre augmented forces. By year eight, the number of AC BCTs available is about the same in the baseline and cadre forces. For the six, nine, and 18 expansions, the minimum number of AC BCTs at home in the baseline forces is 29, 31, and 37 BCTs respectively while the minimum number of BCTs at home in the cadre forces is 23, 22, and 19 BCTs respectively. The minimum number of AC BCTs available in the *CadreMix* baseline force is 29 BCTs while the *CadreMix* force has a minimum of 16 BCTs at home. If we assume that one MRC requires 15 BCTs,[55] each of the cadre augmented forces would have enough AC BCTs available to fight one MRC while engaged in a long war. The equivalent non-cadre forces would be capable of fighting nearly two MRCs while engaged in a long war. Overall, there is an increase in this measure of military risk from moving to a cadre augmented force. However, this may be acceptable given that the cadre augmented force is still capable of fighting two wars: a long-war with rotation and a short-war requiring

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requirement. See Appendix C for a comparison of risk results under different assumptions about peacetime deployments.

[54] See discussion and references in Section 2.2.

[55] Assuming that an MRC requires five divisions [Aspin (1993)] with three BCTs per division.

high-readiness units. Whether or not this increase in risk is acceptable depends on the force

sizing heuristic used by the DoD.[56]

In addition to the total number of AC BCTs available, we might also measure risk as

the number of AC BCTs available with more than one-year at home since their last

deployment. Under ARFORGEN, AC units returning from deployments are in the

reset/train phase in their first year home after a deployment. These units may not be

immediately ready to deploy. Figure 2.6 compares the number of AC BCTs available to

deploy with more than one year at home over the course of a ten-year war in the baseline

and cadre forces for each of the cadre augmented forces.

Figure 2.6—Comparison of AC BCTs Available with more than One Year at Home

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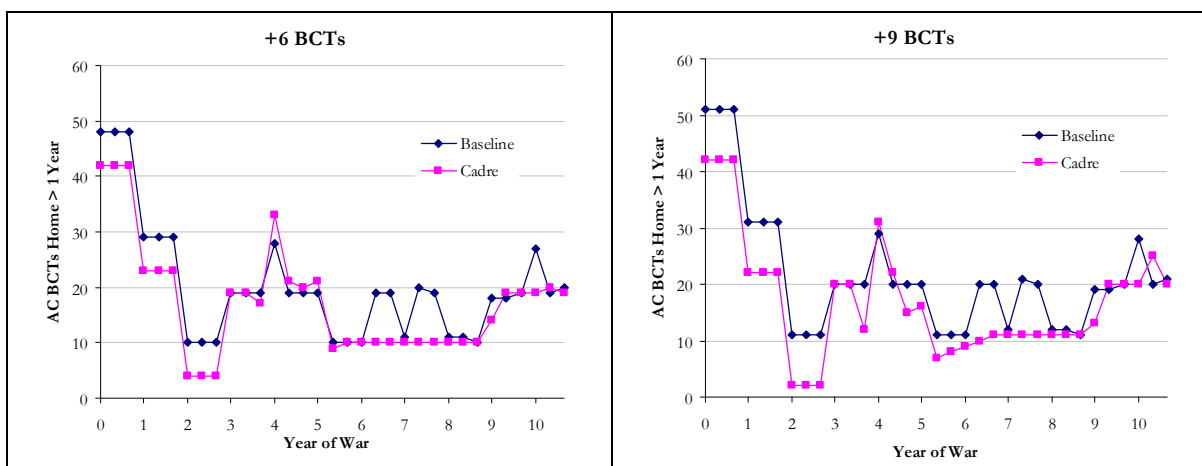
[56] More specifically, we would need to know if the DoD requires a force that can fight a long war and two
short-wars simultaneously or whether a force that can fight one long war and one short-war is acceptable.
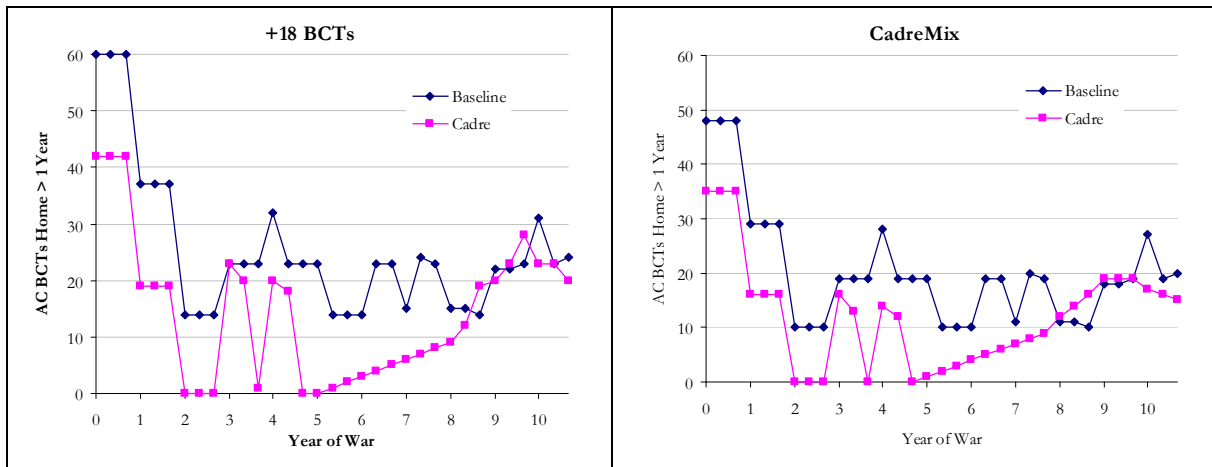
The difference in military risk measured as the number of AC BCTs with more than

one year at home shows a trend similar to that for the total number of available AC BCTs.

The cadre augmented forces have fewer available AC BCTs in peacetime and in years one

through eight of wartime after which the number of available BCTs is about equal. In the

six, nine, and 18 expansions, the minimum number of AC BCTs at home more than one

year in the baseline forces is 10, 11, and 14 BCTs respectively while the minimum number of

BCTs at home in the cadre forces is four, two, and zero BCTs respectively. The minimum

number of AC BCTs available with more than a year at home in the *CadreMix* baseline force

is ten BCTs while the *CadreMix* force has a minimum of zero BCTs at home. While the

baseline forces would have nearly enough BCTs at home more than one year to fight one

MRC requiring about 15 BCTs, the cadre augmented forces would have almost no units at

home more than a year. Again, a cadre augmented force increases military risk.

For each measure of risk, the DoD must decide whether this increase is acceptable in

order to achieve the cost savings provided by a cadre augmented force. We considered these

additional measures of risk because a cadre augmented force requires significant changes that

will take many years to implement during which time the force planning heuristic may

change. While this paper focuses on long wars fought with rotation, as recent as two decades

ago force planning focused on fighting a short-warning global war in more than one theater.

2.4—RELATIVE SIZE OF COST SAVINGS FROM CADRE

This chapter has shown that no matter which way we integrate cadre into the total

force, a cadre augmented force can provide large annual cost savings. However, large is a

relative term. Figure 2.7 shows the peacetime and long-run average cost savings from each

of the cadre augmented forces examined in this chapter as a percentage of the annual cost of

the equivalent non-cadre force that can sustain the same rotation.[57]

Figure 2.7—Relative Cost Savings from Cadre Forces[58]

Force	Long-Run Average Cost		Peacetime Cost	
	Annual Savings	% Annual Cost	Annual Savings	% Annual Cost
+6 BCT	$4 billion	6%	$5 billion	9%
+9 BCT	$6 billion	9%	$8 billion	12%
+18 BCT	$12 billion	16%	$16 billion	21%
CadreMix	$11 billion	17%	$13 billion	22%

Increasing the size of the Army with six cadre BCTs rather than six AC BCTs can

reduce the average long-run (peacetime) cost of the force by six (nine) percent. For larger

expansions, the relative cost savings are larger. The nine BCT cadre expansion reduces the

average long-run (peacetime) cost of the force by nine (12) percent. The 18 BCT expansion

reduces average long-run (peacetime) cost of the force by 16 (21) percent. Replacing AC and

RC units with cadre units while still maintaining the ability to fight two MRCs and meet

homeland security requirements reduces the average long-run (peacetime) cost of the force

by 17 (22) percent. Overall, the cost savings from cadre would significantly reduce the

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[57] For instance, the cost savings from the +18 cadre force were calculated as a percentage of the personnel and operations and maintenance cost of the expanded AC force with 60 AC BCTs and 28 RC BCTS for both peacetime and average long-run costs. Calculations are presented in more detail in Appendix A.
[58] Calculations are described in Section A.5.

Army's annual force structure expenditures both averaged over periods of peace and war and in peacetime. However, some costs are ignored in this analysis. The cost of filling cadre units (increasing recruiting, bonuses to RC personnel, etc.) and the cost of demobilization (separation bonuses, etc.) are not included in these analyses. These costs were excluded because they are difficult to estimate. Including these costs in our analyses would reduce the cost savings from a cadre augmented force. The second paper of this dissertation discusses these costs in more depth.

Another way to compare the size of the cost savings from cadre is to consider other proposals to reduce defense costs. Recent proposals to achieve annual cost savings of the same magnitude have included:

- cutting two air force wings, two navy wings, and two aircraft carriers (~$6 billion annually)[59]

- scaling down national missile defense (~$9 billion annually)[60]

- restructuring the future combat system (~$5 billion annually)[61]

- reducing the size of the strategic nuclear arsenal ($10-15 billion annually)[62]

These are all significant proposals that require making major changes and would likely increase military risk. A cadre augmented force also requires making significant changes and increases military risk. The increase in risk relative to cost savings for any of these reform proposals should be carefully considered by the DoD. A cadre augmented force is simply another option that is worth exploring. This chapter has presented the tradeoffs for the DoD to consider regarding this alternative.

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[59] Conetta (2007b)

[60] Tebbs (2007)

[61] Tebbs (2007)

[62] Korb and Bergmann (2007), p. 32

3. FREQUENCY OF WARS

Chapter Two shows that a cadre augmented force can significantly reduce annual costs. The long-run average cost calculations performed in that chapter assumed that wars will occur 33 percent of the time in the future. This assumption was made to simplify the presentation of results. In reality, it is extremely difficult to estimate how frequently wars will occur in the future. We chose 33 percent in the previous chapter because this was the historical rate of wars occurring since World War II calculated by Doyle and Gotz (2007). This chapter explores the sensitivity of the average long-run cost results presented in Chapter Two to the frequency of wars while holding all other parameters constant.[63]

We found that when wars occur 33 percent of the time, increasing the size of the force by six, nine and 18 cadre BCTs reduced average long-run annual costs by $4, $6, and $12 billion respectively. We also found that changing the mix of the *2011* force by replacing 13 AC units with 13 cadre units and nine RC units with three cadre units reduced average long-run annual costs by $11 billion. These results are sensitive to the assumption we made about the frequency of future wars. Figure 3.1 shows how the average long-run cost savings vary with the frequency of war for each of the cadre augmented forces we analyzed in Chapter Two. To perform this analysis, we held the time horizon constant at thirty years and varied the length of wars from zero to thirty years. The length of war and time horizon together determines the frequency of war.

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[63] The peacetime cost savings are not sensitive to the frequency of war and are therefore ignored in this chapter.

Figure 3.1—Sensitivity of Average Long-Run Cost Savings from Cadre Forces to Frequency of Wars
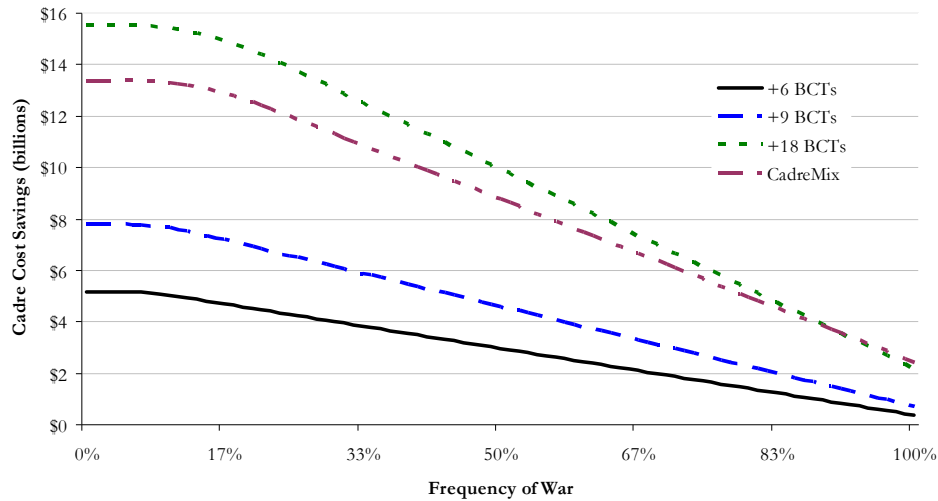
Replacing AC and RC units with cadre units provides larger cost savings the less frequently wars occur. When wars are more frequent, cadre units provide lower savings because they are mobilized for a larger fraction of the time. In the extreme case, when wars occur 100 percent of the time, cadre units still reduce costs because not all cadre units are mobilized during the first years of a thirty-year war. Cadre units are recruited and trained incrementally during the first years of a war. This is why there is a knee in the curve for each of the cadre augmented forces. When wars are short (infrequent), there is no variation in the cost savings from cadre because cadre units are not mobilized in these wars.[64] As wars become longer (more frequent), the cost savings from cadre decrease as cadre units are mobilized for a larger and larger percentage of wartime.[65] The cost savings from cadre decrease at a higher rate for larger cadre forces because while only a small percentage of

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[64] We assume a one-year deliberation delay in activation. This means that no cadre units are mobilized in the first year of a war.

[65] See Appendix A for a graph of the relationship between percentage of time cadre units are mobilized in wartime and the length (frequency) of wars.

cadre units are mobilized during short wars, as wars get longer, *all* cadre units are mobilized for a larger fraction of the time. In the limit, if we considered a time horizon longer than 30 years, the cost savings from all cadre augmented forces would go to zero when wars occur 100 percent of the time because the fraction of time cadre units are mobilized during wartime will approach 100 percent.[66]

It is very unlikely that wars will occur near 100 percent of the time in the future. It is more reasonable to assume that wars might occur somewhere between one-sixth and one-half of the time.[67] Over this range, the annual cost savings are summarized in Table 3.1.

Table 3.1—Sensitivity of Average Long-Run Annual Savings from Cadre Forces to Frequency of Wars

Force	Annual Savings		
	17% War	*33% War*	*50% War*
+ 6 BCTs	$5 billion	$4 billion	$3 billion
+ 9 BCTs	$7 billion	$6 billion	$5 billion
+18 BCTs	$15 billion	$13 billion	$10 billion
CadreMix	$13 billion	$11 billion	$9 billion

When wars occur 15 percent of the time, the cadre expansions of six, nine, and 18 BCTs reduce annual costs by $5, $7, and $15 billion while the *CadreMix* force reduces annual costs by $13 billion. When wars occur fifty percent of the time, expanding the force by six, nine, and 18 cadre BCTs reduces annual costs by $3, $5, and $10 billion and the *CadreMix* force reduces annual costs by $9 billion. Over this range of estimates for the frequency of

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[66] This explains why the slope of the cost savings lines is larger for larger cadre forces. A larger cadre force saves more money when wars occur zero percent of the time, but when wars occur 100 percent of the time, all cadre forces provide the same (zero) savings in the limit. Therefore, it must be the case that the rate of cost savings reductions is higher for larger cadre forces. In Figure 3.1, the cost savings are not equal (or zero) when wars occur 100 percent of the time because of the thirty-year time horizon we chose to examine. If we considered a longer time horizon, the savings would be close to equal (zero) for all cadre forces.

[67] This is a sixty percent increase/reduction in the frequency of wars from the Doyle and Gotz estimate. Although it is impossible for anyone to predict the frequency of future wars, it seems reasonable to assume that wars will not become more than sixty percent more/less frequent in the future.

future wars, replacing AC and RC units with cadre units still reduces annual costs by billions of dollars. Even though it is unlikely that wars will occur *exactly* 33 percent of the time in the future, we can be confident that as long as future wars occur less than 50 percent of the time, a cadre augmented force can provide significant average long-run annual cost savings.

4.   PEACETIME COST ESTIMATES

In Chapter Two, we used estimates from previous studies for the peacetime cost of RC and cadre units. We assumed that during peacetime each RC unit costs 28 percent of an AC unit and that each cadre units costs 20 percent of an AC unit.[68] However, the peacetime cost of RC and cadre units is difficult to estimate accurately.[69] In this chapter, we explore the sensitivity of the results in Chapter Two to assumptions about the peacetime cost of cadre and RC units.

4.1—CADRE PEACETIME COST

To explore the sensitivity of the results in Chapter Two to the peacetime cost of cadre, we must first define a plausible range. As discussed in Chapter One, the peacetime cost of a cadre unit will depend on the design of the cadre unit. The larger the size of the cadre, the more expensive the cadre unit will be. In Chapter Two, we assumed that a cadre unit costs 20 percent of an AC unit during peacetime. We derived this estimate from CBO (1992) for a cadre unit that retains 25 percent of its personnel during peacetime. In the second paper of this dissertation, we find that a cadre unit retaining all officers and NCOs would retain 43 percent of its wartime personnel at a cost of 56 percent of an AC unit. Given the different possible personnel configurations of cadre units, we explore a range of peacetime cadre costs from five to sixty percent of an AC unit. The second paper in this dissertation discusses cadre unit designs and their cost differences in more depth.

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[68] RC Cost: Jaffe (2006), Cadre Cost: CBO (1992)

[69] See Appendix A for a discussion of estimating the peacetime cost of existing RC units. Since cadre units do not exist, it is even harder to predict their peacetime cost.

Figure 4.1 shows the sensitivity of the average long-run cost savings from the cadre

augmented forces analyzed in Chapter Two to the peacetime cost of cadre units. The results

for the peacetime cost savings are similar.

Figure 4.1—Sensitivity of Average Long-Run Cost Savings from Cadre Forces to Peacetime Cadre Cost
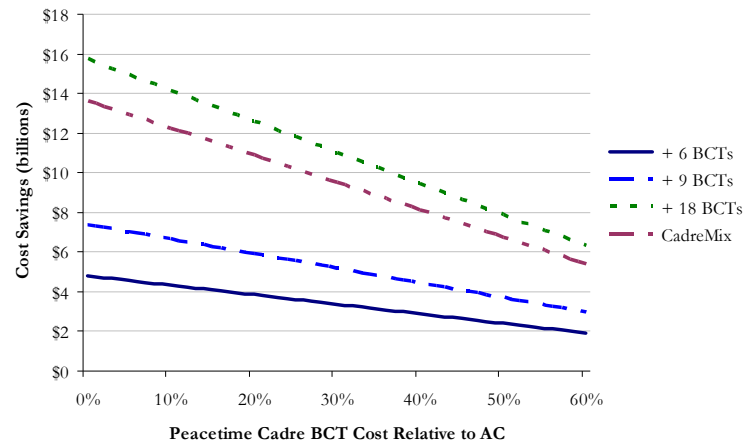
Figure 4.1 shows that the average long-run cost savings from a cadre augmented

force decrease as the peacetime cost of a cadre unit increases. However, the cost savings

remain in the billions of dollars even when the peacetime cost of a cadre unit is higher than

that of an RC unit (28 percent) because cadre units can be used much more intensively than

RC units in wartime. Therefore, fewer units need to be maintained in peacetime. Even when

a cadre unit costs 56 percent of an AC unit,[70] a cadre augmented force still reduces average

long-run costs by $2, $3, and $7 billion annually for the six, nine, and 18 BCT expansions

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[70] This is the cost of a cadre unit retaining all officers and NCOs in peacetime.

and $6 billion for the *CadreMix* force. The peacetime cost savings are larger but the

relationship is similar.[71]

4.2—RC PEACETIME COST

In Chapter Two, we calculated that trading nine RC BCTs for three cadre BCTs

could save about $2 billion per year in average long-run cost when an RC unit costs 28

percent of an AC unit during peacetime. Figure 4.2 shows the sensitivity of this result to RC

peacetime cost. The result is similar for peacetime costs.

Figure 4.2—Sensitivity of Average Long-Run Cost Savings from Cadre/RC Tradeoff to Peacetime RC Cost
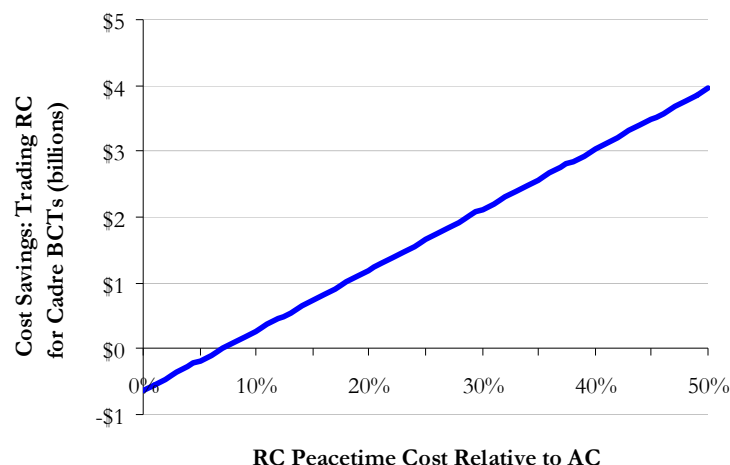
As the relative cost of an RC BCT decreases, the cost savings that can be achieved

from trading RC BCTs for cadre BCTs decreases.[72] Even when the peacetime cost of RC

units is very low (ten to twenty percent of an AC unit), replacing RC units with cadre units

still reduces costs because cadre units can be used more intensively during wartime. If the

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[71] When a cadre unit costs 56 percent of an AC unit, the peacetime annual cost savings from the six, nine, and 18 BCT expansions are $3, $4, and $9 billion respectively and the peacetime annual cost savings from the *CadreMix* force are $7 billion.
[72] This assumes the cost of a cadre unit relative to an AC unit is held constant at twenty percent.

cost of an RC unit drops below eight percent of an AC unit, then trading RC units for cadre units *increases* costs. However, it is unlikely that the cost of an RC unit is as low as eight percent since the relative cost of an RC unit calculated from only basic pay differences is 16 percent of an AC BCT.[73]

Over a range of estimates for the cost of an RC BCT, trading RC BCTs for cadre BCTs significantly reduces annual costs. However, the peacetime cost of RC and cadre BCTs are only one piece of analyzing this tradeoff. The other piece is calculating the number of units needed to sustain one deployed unit from each force. This is calculated based on the rotation guidance, which we discuss in the next chapter.

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[73] Klerman et al (2008)

5. WILLINGNESS TO STRESS THE AC WHILE CADRE UNITS MOBILIZE

The analyses in Chapter Two assume that the DoD would be willing to allow some AC units to break rotation guidance while cadre units mobilize. The willingness of the DoD to place stress on the AC while cadre units mobilize affects the attractiveness of a cadre augmented force. The less willing the DoD is to let some AC units break rotation guidance, the more reserve units needed in the force. This reduces the cost savings from a cadre augmented force. It is unclear how willing the DoD will be to deploy AC units with less than two years at home in the future. This chapter calculates the cost savings from a cadre augmented force for different assumptions about the willingness of the DoD to allow some AC units to break rotation guidance. We begin by assuming that the DoD does not allow any unit to break rotation guidance and then relax this assumption incrementally.

5.1—STRICT ADHERENCE TO ROTATION GUIDANCE

We start this analysis by calculating the cost savings from a cadre augmented force when all units are required to strictly adhere to rotation guidance. This assumption creates a worst-case scenario for a cadre augmented force because it requires the largest number of RC units in peacetime. We assume that the force is built ex-ante so that no unit will break rotation guidance in wartime.

In order to perform this analysis, we must choose one of the cadre augmented forces analyzed in Chapter Two to use as an example. In this section, and those that follow, we will analyze the *CadreMix* force.[74] The qualitative results for the other cadre augmented forces examined in Chapter Two will be similar. The *CadreMix* force has 35 AC BCTs and 16 cadre

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[74] The *CadreMix* force was designed to sustain the same rotation as the *2011* force (19 BCTs).

BCTs. When we allow some AC units to deploy with as little as 12 months at home while cadre units mobilize, this force can meet the demand for deployed forces in every year with just 19 RC BCTs.

If we assume that that *no* AC unit can be deployed with less than two years at home, then a greater number of RC units must be maintained in the force. Figure 5.1 shows the notional wartime deployment of the *CadreMix* force when all units strictly adhere to rotation guidance.

Figure 5.1—Time Phased Deployment for Cadre Force Strictly Following Rotation Guidance
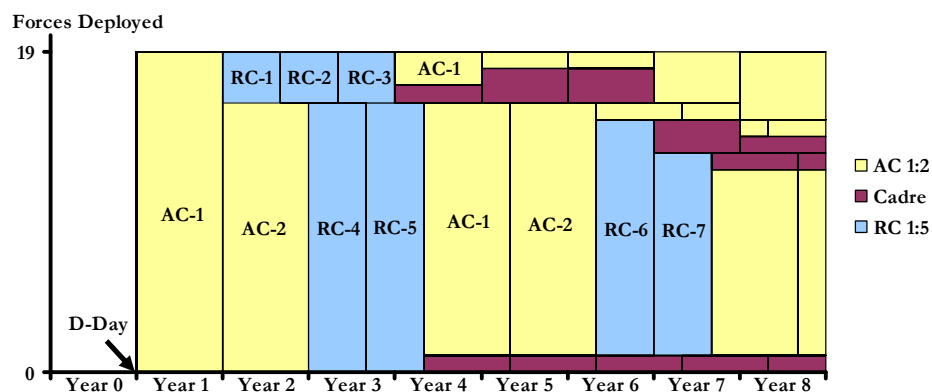
In year one, 19 AC BCTs (AC-1) are deployed because they are the only units that are immediately available for deployment.[75] The remaining AC units (AC-2) are deployed in year two. Cadre units are available beginning in year four at a rate of three BCTs per year (one per trimester). We assume that AC and cadre units are redeployed only after spending a full two years at home. We fill the remaining slots in the rotation with RC units.[76] To meet

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[75] See the introduction to this dissertation for a brief discussion about how ARFORGEN will affect these notional deployments.

[76] The RC is the most cost-effective force for filling these rotation slots because we assume cadre units cannot be mobilized quickly enough for these slots and RC units are cheaper than AC units assuming a 1:1 trade-off between AC and RC units.

the force requirements in years two and three without breaking rotation guidance, three

groups of 9 RC BCTs (RC-1, RC-2, RC-3) and two groups of 14 RC BCTs (RC-4 and RC-5)

are required. These groups of RC units are not available for redeployment until year eight.

Therefore, 26 new RC BCTs (RC-6 and RC-7) are required to fill the requirement in years

six and seven. In total, 67 RC BCTs are required so that no unit breaks rotation guidance.

This *increases* average long-run cost by $6 billion annually relative to the *2011* force.[77]

Restricting all units to rotation guidance makes a cadre augmented force unattractive

because excess force structure needs to be maintained in peacetime for the periods before

cadre units are ready to deploy. A cadre augmented force restricted to rotation guidance

maintains more RC units than are needed to sustain rotation over the long term. The cadre

augmented force we just examined can sustain 24 deployed BCTs in wartime. It does this at

an annual cost of $6 billion more than the *2011* force, which can only sustain 19 BCTs.

In this section, we have seen that a cadre augmented force would not decrease costs

under the strictest possible assumption about the DoD's willingness to stress the AC. A

cadre augmented force becomes more attractive when some AC units are allowed to break

rotation guidance while cadre units mobilize. The next section will show how incrementally

relaxing adherence to rotation guidance leads to larger cost savings from a cadre augmented

force.

5.2—INCREMENTALLY RELAXING ADHERENCE TO ROTATION GUIDANCE

In the previous section, we saw that when we restrict all units to rotation guidance

there are no cost savings from a cadre augmented force because many more RC units must

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[77] In this section and those that follow, we calculate only the sensitivity of average long-run cost savings to various assumptions. The order of magnitude will be the same when measured as peacetime cost savings.

be maintained than are needed to sustain deployments over the long-term. In this section, we will show that relaxing the assumption that all AC units must obey rotation guidance while cadre units mobilize increases the cost savings from a cadre augmented force by reducing the number of RC units required. We use the Long War Assignment Model's (LWAM) Cadre Force Optimizer to calculate the number of RC units required.

5.2.1—The Cadre Force Optimizer

The Cadre Force Optimizer takes the number of AC and cadre units as input by the user and determines the smallest number of RC units required for a given set of force use parameters (dwell time, deployment length, etc.). The model begins with a force containing the specified number of AC and cadre units and calculates an initial number of RC units based on the steady-state demand. The model then simulates the deployment of this force for the specified demand and war length.[78] If the model is unable to meet the requirement for deployed forces under the restrictions input by the user, the model will increase the size of the RC force until it reaches a feasible solution. Once a feasible solution is found, the model calculates the cost of this force and graphs the amount of stress placed on the AC. The analyses that follow use the LWAM cadre force optimizer to determine the smallest number of RC units needed to sustain a cadre augmented force under differing assumptions about the DoD's willingness to let AC units break rotation guidance.

5.2.2—Breaking Rotation Guidance

This analysis incrementally relaxes the constraint that AC units must be used according to DoD guidance. We allow AC units to be deployed with fewer than two years at

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[78] In all of the analyses in this paper we assume that wars last on average ten years.

home during the period that cadre are preparing for deployment, but not thereafter. However, we restrict the model so that AC units cannot be deployed with less than one year at home. This is consistent with the DoD's practice as of 2007 when deployments were lengthened in order to maintain one year at home between deployments for AC units.[79]

Allowing some AC units to break rotation guidance reduces the number of RC BCTs that need to be maintained in peacetime. When we allow some AC BCTs to be deployed with no less than 20 months at home, the LWAM cadre force optimizer calculates that this force requires 55 RC BCTs. This is twelve fewer RC BCTs than the force that strictly adheres to rotation guidance. This force still *increases* average long-run costs by $2 billion per year relative to the *2011* force. We repeat this process assuming the DoD is willing to allow AC units to be deployed with no less than 16 and 12 months at home. Table 5.1 shows the size of each component and cost savings for each of these forces.

Table 5.1—Sensitivity of Average Long-Run Annual Cost Savings from *CadreMix* Force to Willingness of the DoD to Allow AC to Break Rotation Guidance

Force	AC BCTs	RC BCTs	Cadre BCTs	Deployed BCTs	Annual Cost Savings
2011	48	28	0	19.1	-
Cadre (24+ months)	35	67	16	24.4	-$6 billion
Cadre (20+ months)	35	55	16	23.1	-$2 billion
Cadre (16+ months)	35	52	16	22.8	-$1 billion
Cadre (12+ months)	35	19	16	19.1	$11 billion

Under the assumption that AC units could be deployed with 16 or more months at home while cadre mobilize, a reserve force of 52 BCTs is required. This force costs $1 billion more annually than the *2011* force. If the DoD is willing to deploy AC units with 12 or more months at home then this force requires only 19 RC BCTs. This force saves $11

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[79] Garamone (2007)

billion annually relative to the *2011* force. The shorter the dwell time that the DoD is willing

to allow for AC units while cadre units mobilize, the more attractive a cadre augmented

force. In this case, a cadre augmented force only reduces annual costs if AC units can deploy

with as little as 12 months at home while cadre units mobilize.

Even though AC units are permitted to deploy with less than two years at home in

each of these cadre augmented forces, the percentage of units deployed with less than two

years at home is small relative to the percentage of AC units being deployed to Iraq and

Afghanistan with less than two years at home as of 2008. Figure 5.2 shows the percentage of

AC units deployed with 20, 16, and 12 or fewer months at home for each of the forces

analyzed in this section.

Figure 5.2—AC Stress by Willingness to Break AC Rotation Guidance
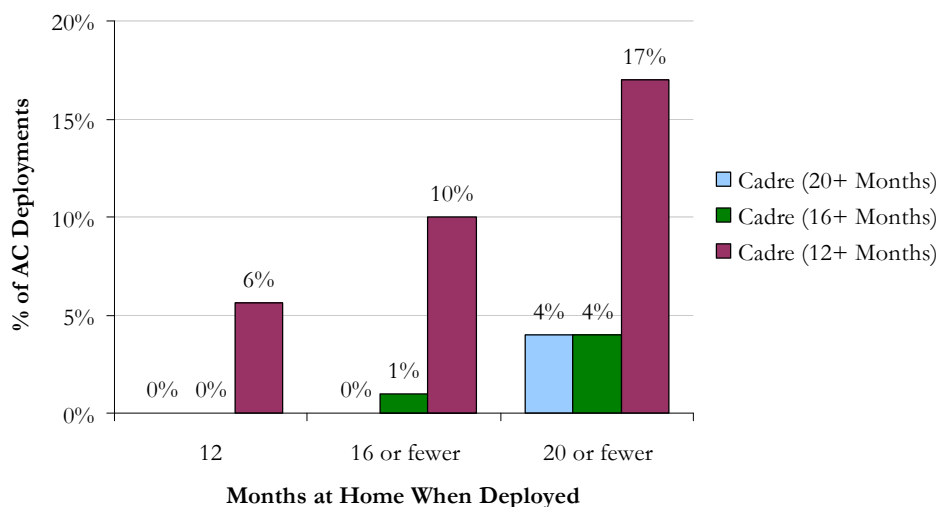
For the force that allows AC units to deploy with 20 or more months at home, only

four percent of all AC deployments are units with less than two years at home. For the force

that allows AC units to deploy with 16 or more months at home, four percent of all AC

deployments are units with 20 months or fewer at home and one percent are units with 16

months at home. For the force that allows AC units to be deployed with 12 or more months at home, the percentage of units deployed with 20, 16, and 12 or fewer months at home are 17, ten, and six percent respectively. Overall, the stress on the AC for all of these forces is small compared to the percentage of units deployed to Iraq and Afghanistan with less than two years at home. However, the DoD would have to decide whether this level of stress is acceptable in order to achieve the cost savings from cadre. For the cadre augmented forces examined here, the majority of AC units get a full two years at home, and all units get at least one year at home before being redeployed.

We have seen that accepting shorter dwell times for AC units while cadre units mobilize increases the attractiveness of a cadre augmented force. Restricting all units to rotation guidance required maintaining an RC force more than three times as large as that required if we allow AC units to deploy with as little as one year at home. As we incrementally relaxed this assumption, we saw that the cost savings from a cadre augmented force increase substantially when AC units are allowed to deploy with as little as 12 months at home. We also saw that even when we allow AC units to deploy with less than two years at home, the percentage of units actually deployed with less than two years at home is small.

6. FUTURE ROTATION GUIDANCE

In all of the analyses thus far, we assumed that the DoD will continue to follow the rotation guidance as of 2007 in the future. However, it is possible that the DoD will issue different rotation guidance in response to future force demands. The rotation guidance as of 2007 was issued with an awareness of the requirements of operations in Iraq and Afghanistan.[80] Future wars may lead to different assumptions. Changes to rotation guidance can significantly affect the cost savings from a cadre augmented force. This chapter explores the impact of changing rotation guidance for AC and RC units on the attractiveness of a cadre augmented force.

6.1—AC ROTATION GUIDANCE

As of 2007, the DoD has stated that its goal is to provide two years at home for every one year deployed for AC units (1:2). However, the wars in Iraq and Afghanistan have required deploying almost every AC unit with only one year at home between deployments.[81] Although this practice has been criticized, it is possible that the DoD will continue to deploy units in this manner. It is also possible that the repercussions of this practice will lead the DoD to be more cautious with rotation guidance in the future. Therefore, it is worth exploring the attractiveness of a cadre augmented force under both assumptions. We examine the effect of rotating AC units both more and less intensively in future wars.

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[80] Prior to the wars in Iraq and Afghanistan, overseas deployments of six months followed by 24 months at home were considered the norm. [Williams (2001), p. 192]

[81] Korb, Rundlet, and Duggan (2007); GAO (2007a)

6.1.1—Using the AC More Intensively

We begin by assuming that the DoD will rotate AC forces in future wars as they have for operations in Iraq and Afghanistan- with one year deployments and one year at home between deployments (1:1). If we assume the rotational requirement remains the same as the *2011* force can sustain (19 BCTs) and that the AC is sized to fight two simultaneous MRCs (35 BCTs) as we assumed for the *CadreMix* force, we can use the LWAM to show that a smaller cadre augmented force can be maintained if AC units are rotated 1:1.

If all AC units are rotated 1:1, then fewer RC and cadre BCTs are required in the force. A cadre augmented force with 35 AC BCTs only requires three cadre BCTs to sustain a 19 BCT rotation over the long-term and an additional seven RC BCTs to fill the gap while cadre units mobilize.[82] The equivalent force without cadre units would need 18 RC BCTs in addition to the 35 AC BCTs. Relative to this force, the cadre augmented force reduces average long-run annual costs by $2 billion per year.[83] Even if AC forces are rotated more intensively in future wars, a cadre augmented force can still significantly reduce costs compared to the equivalent force without cadre.

6.1.2—Using the AC Less Intensively

After the operations in Iraq and Afghanistan are complete, it will likely take the Army many years to recover as it did after Vietnam. This may lead the DoD to alter rotation

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[82] The number of cadre BCTs was calculated by subtracting the number of continuously deployed units from the AC force (35/2=17.5 BCTs) from the requirement (19 BCTs) and multiplying the result by the number of cadre units needed to sustain the additional BCTs (1.5*2=3 BCTs). The number of RC BCTs was calculated using the LWAM Cadre Force Optimizer.

[83] Like the previous chapter, this chapter will use only average long-run cost savings as a metric. The sensitivity of the peacetime cost savings will be similar.

guidance to use AC units less intensively in the future.[84] We can explore the impact of

changes to rotation guidance by representing each set of rotation guidance policies as the

number of units per deployed BCT.[85] The number of units per deployed BCT depends on

the deployment length and dwell time (time at home between deployments) specified by the

rotation guidance policy. Different rotation guidance policies can have the same number of

units per deployed BCT. For instance, a rotation policy that specifies eight-month

deployments followed by 24 months of dwell time requires the same number of units per

deployed BCT (four) as a policy that specifies 12 month deployments followed by 36

months of dwell time. Figure 6.1 shows the number of units per deployed AC BCT for

various combinations of dwell times and deployment lengths.

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[84] In April of 2008, Eric Schoomaker, the Surgeon General of the Army testified before the United States Senate that "the optimal tour in Afghanistan and Iraq to reduce combat stress should be six to nine months with 18 months at home." [Brewin (2008)] A Nine month deployment with 18 months at home is the same as existing rotation guidance (1:2) which requires three units at home for every one deployed. Six month deployments would mean using the AC less intensively than the current rotation guidance; it would increase the number of AC units needed at home to four for every unit deployed.
[85] The number of units per deployed BCT is the number of units required to sustain one BCT deployed continuously. It is calculated by dividing the sum of mobilization length and dwell time by deployment length. For instance, for the 2007 AC rotation guidance of one year deployed followed by two years at home (1:2), the number of AC units per deployed BCT is 3 ([2+1]/1). Appendix A contains more detail on calculating this parameter.

Figure 6.1—Number of AC Units per Deployed BCT by Deployment Length and Dwell Time

		| Dwell Time (Months)						
		12	18	24	30	36	42	48
Deployment Length (Months)	3	5	7	9	11	13	15	17
	6	3	4	5	6	7	8	9
	9	2	3	4	4	5	6	6
	12	2	3	3	4	4	5	5
	15	2	2	3	3	3	4	4

As deployment lengths decrease or dwell times increase, the number of units required per deployed BCT increases. This means that a larger number of AC units need to be maintained in the force to sustain the same rotation.

If we assume that the AC is sized with the minimum number of BCTs required to fight two simultaneous MRCs (35 BCTs) as we did for the *CadreMix* force and the RC is maintained at the *2011* force level (19 BCTs), we can explore the impact of using the AC less intensively on the cost savings from a cadre augmented force. We do this by calculating how many cadre units need to be maintained in the force to sustain the same rotation as the *2011* force.[86] Table 6.1 shows the cost savings from cadre augmented forces for a range of number of units per deployed BCT.

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[86] This analysis assumes that cadre units are used according to AC rotation guidance when mobilized.

Table 6.1—Sensitivity of Average Long-Run Annual Savings from *CadreMix* Force to Number of Units per Deployed BCT

Units per Deployed BCT	AC BCTs	RC BCTs	Cadre BCTs	Deployed BCTs	Annual Cost Savings
3	*48*	*28*	*0*	*19.1*	-
3	35	19	16	19.1	$11 billion
4	35	19	33	19.1	$4 billion
5	35	19	50	19.1	-$2 billion
6	35	19	67	19.1	-$9billion

As the number of units per deployed BCT increases, the cost savings from a cadre augmented force decrease. Therefore, if the DoD decides to either shorten deployment length or increase dwell time for AC units, a cadre augmented force is less attractive. However, to get to the point where a cadre augmented force would *increase* costs relative to the *2011* force requires that the DoD either set AC dwell time to more than three years or to shorten deployments to less than six months. Neither of these seems very likely given that dwell time of two years is generally seen as adequate and one-year wartime deployments have become the norm.

6.2—RC ROTATION GUIDANCE

It is also possible that the DoD will change the rotation guidance for RC units in the future. Operations in Iraq and Afghanistan have required deploying some RC brigades with three to four years at home between deployments instead of the specified five.[87] The DoD may continue to follow this wartime deployment practice in the future. In this section, we explore the impact of using the RC more intensively on the attractiveness of a cadre augmented force.[88]

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[87] Korb and Duggan (2007), Freedberg (2007)

[88] We do not explore the impact of using the RC less intensively because it is obvious that this would significantly increase the attractiveness of a cadre augmented force.

Using the RC more intensively affects the cost savings from trading RC units for cadre units. In the *CadreMix* force, we traded nine RC BCTs for three cadre BCTs, which reduces average long-run savings by about $2 billion annually. If the RC is used more intensively, the ratio of trading RC BCTs to cadre BCTs decreases. This reduces the annual cost savings from trading RC BCTs for cadre BCTs. Table 6.2 shows the cost savings from trading RC units for cadre units under different assumptions about RC rotation.

Table 6.2—Average Long-Run Cost Savings from RC for Cadre Tradeoff when RC is Used More Intensively

RC Rotation	RC BCTs per 3 Cadre BCTs	Annual Cost Savings
RC 1:5	9	$1.8 Billion
RC 1:4	7.5	$1.3 Billion
RC 1:3	6	$0.8 Billion

Deploying RC units one year in five (1:4) reduces the annual cost savings from $1.8 billion to $1.3 billion. Deploying RC units one year in four (1:3) decreases the cost savings even further, to $0.8 billion annually. However, even when we use the RC as intensively as we could imagine (1:3), trading RC BCTs for cadre BCTs still reduces annual costs.

Although using the RC more intensively reduces the cost savings from a cadre augmented force, it also decreases the stress on the AC. Figure 6.2 shows the stress on the AC for the *CadreMix* force under differing assumptions about rotation guidance for the RC.

Figure 6.2—Stress on the AC when RC is Rotated More Intensively
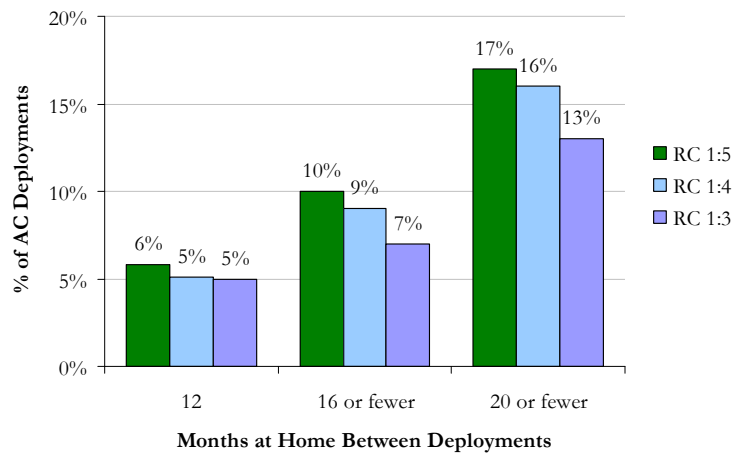
As the RC is used more intensively, stress on the AC decreases because RC units are available to redeploy in the period during which cadre units are mobilizing. However, this decrease is not very significant given the stress placed on the RC.[89] The percentage of AC units deployed with 20, 16, and 12 or fewer months at home drops by only one to four percent as the frequency of RC rotation increases from one year in six (1:5) to one year in four (1:3).

The reduction in the cost savings from a cadre augmented force due to using the RC more intensively is balanced by a decrease in stress on the AC. Overall, a cadre augmented force still reduces annual costs when the RC is used more intensively, with the additional benefit that using the RC more intensively reduces stress on the AC.

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[89] It is unlikely that DoD would be willing to accept three year dwell times for RC units given the nature of reserve service. Deployments as frequent as every four years would disrupt the civilian careers of many reservists and would likely lower recruitment and retention.

7. READINESS

We have thus far assumed that RC units require four months of post-mobilization training and that a cadre force requires 36 months before the first unit is ready to deploy with three cadre BCTs ready for deployment every year thereafter. Both of these are simple estimates and may not represent the true readiness of these forces in the future. The post-mobilization training required by RC units could be much lower in the future as the Army is attempting to reduce the post-mobilization training as part of ARFORGEN. There is also little historical evidence about the post-mobilization training requirements of cadre units.[90] Cadre units could require more or less post-mobilization training in the future than we have estimated thus far.[91] This section examines the impact of assumptions about the readiness of cadre and RC units on the attractiveness of a cadre augmented force.

7.1—CADRE READINESS

The analyses in Chapter Two assume that the first cadre unit would be ready to deploy 36 months after the beginning of a war and that three cadre units would be ready every year thereafter. The delay was based on an assumed one-year deliberation delay followed by four months to fill and 20 months to train one BCT. Given the four months needed to fill a new BCT, three new BCTs would be ready to deploy every year thereafter.[92]

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[90] In the early 1990s, the Army estimated that a cadre unit could be ready to deploy in as little as one year. Many were skeptical of this estimate. [CBO(1992)]

[91] It is likely that the amount of time required post-mobilization training will depend on the cadre unit structure and organization. This issue is discussed in Paper II of this dissertation.

[92] This is based on the assumption that increased recruiting would be utilized to fill out cadre units. Other ways of filling cadre units such as IRR activation would both increase the mobilization rate and decrease the mobilization delay.

Figure 7.1 shows the cadre readiness profile that we assumed for each of the analyses in this paper.

Figure 7.1—Assumed Cadre Readiness Profile
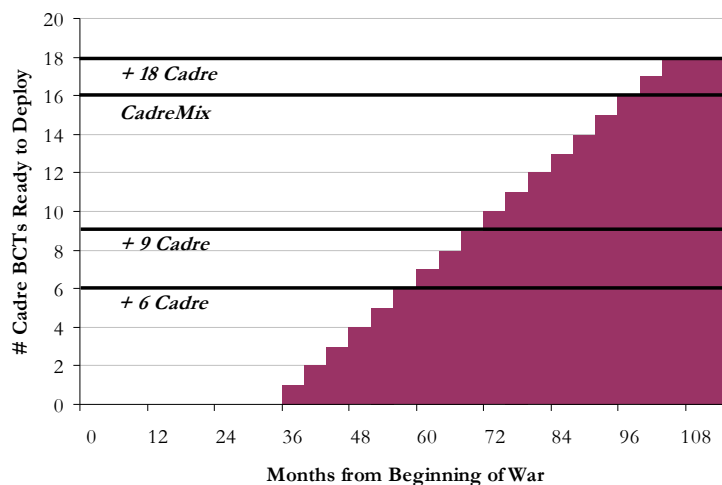
There are two components to cadre readiness: mobilization delay (how soon the first cadre unit is ready) and mobilization rate (how quickly cadre units are ready thereafter). This section explores the impact of both the mobilization delay and mobilization rate on the cost savings from a cadre augmented force. In the first subsection, we hold constant the mobilization rate and vary the mobilization delay. In the second subsection, we vary the rate at which cadre units are ready to deploy holding constant the mobilization delay at 36 months. For each of these analyses, we use the LWAM's Cadre Force Optimizer to calculate the number of RC units needed in the force for various assumptions about the willingness of the DoD to allow AC units to break rotation guidance. For these analyses, we examined the *CadreMix* force with 35 AC BCTs and 16 cadre BCTs. The general results for this force hold true for all of the other cadre augmented forces examined in this paper.

7.1.1—Mobilization Delay

Cadre mobilization delay has a significant impact on the number of RC BCTs required in the force. The shorter the cadre mobilization delay, the fewer RC BCTs that need to be maintained in peacetime. Figure 7.2 shows the number of RC BCTs required by mobilization delay under different assumptions about the willingness of the DoD to allow AC units to break rotation guidance.

Figure 7.2—Sensitivity of RC BCTs Required in the *CadreMix* Force to Cadre Mobilization Delay
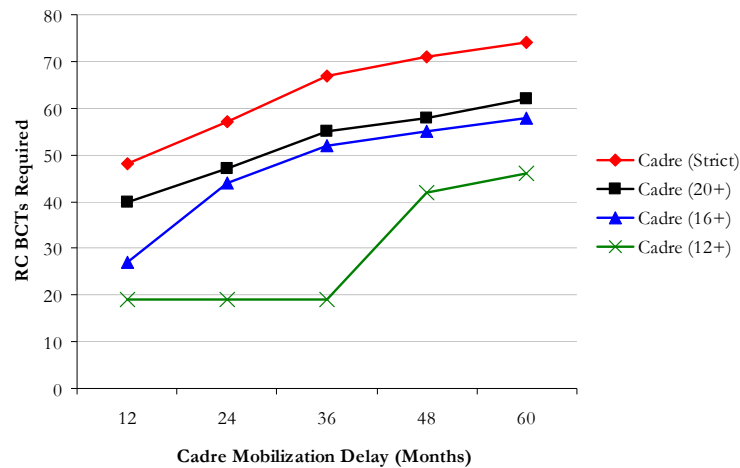
When the DoD is willing to deploy AC units with 12 or more months at home, longer mobilization delays only increase the number of RC BCTs required in the force if the delay is longer than 36 months. When the DoD is only willing to deploy AC units with more than 16, 20 or 24 months at home, the number of RC BCTs required in the force increases as the mobilization delay increases. The shorter the mobilization delay, the more attractive a cadre augmented force because fewer RC BCTs need to be maintained in peacetime. Figure

7.3 shows how the average long-run cost savings from a cadre augmented force vary with

cadre mobilization delay.[93]

**Figure 7.3—Sensitivity of Average Long-Run Cadre Cost Savings from *CadreMix*
Force to Cadre Mobilization Delay**
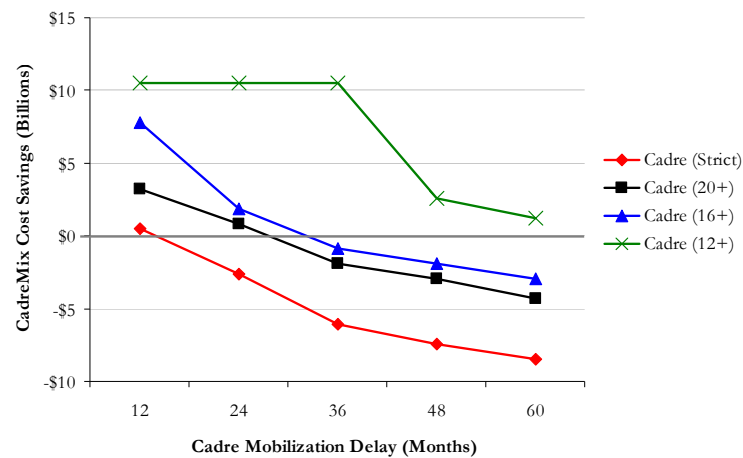
The cost savings from a cadre augmented force decrease as the cadre mobilization

delay increases. When AC units are allowed to deploy with as little as 12 months at home, a

cadre augmented force always reduces costs even if the first cadre unit is not mobilized until

60 months after the beginning of the war. However, the average long-run cost savings

decrease from $11 billion (36 month delay) to about $1 billion (60 month delay). When cadre

units can only deploy with 16 and 20 months at home, a cadre augmented force begins to

increase costs when the mobilization delay is longer than 24 months. When AC units must

strictly adhere to rotation guidance, a cadre augmented force only reduces costs if the

mobilization delay is 12 months or less.

Assumptions about mobilization delay have a significant impact on the attractiveness

of a cadre augmented force. Assuming that the DoD is willing to allow AC units to deploy

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[93] Peacetime cost savings follow the same trend but are slightly larger at all points.

with as little as 12 months at home while cadre units mobilize, a cadre augmented force still provides cost savings measured in the billions of dollars even if cadre mobilization is delayed as long as five years, though the savings are significantly smaller.

7.1.2—Mobilization Rate

Thus far, we have assumed that after an initial mobilization delay, three cadre BCTs would be ready to deploy every year thereafter. We chose this mobilization rate because it was the highest rate that appeared feasible if cadre units were filled out by increasing end-strength and activating the IRR in wartime.[94] The 2007 force expansion of six BCTs was expected to take four years,[95] a rate of 1.5 BCTs per year. The mobilization rate for cadre units would likely be significantly faster than that of new units given that they already have leadership and some equipment in place and would only need to recruit and train the remainder of the unit. Therefore, it is not unreasonable to assume a rate double that of creating new units: three BCTs per year (one per trimester). However, it is possible that cadre units could mobilize either more or less rapidly.[96] In this subsection, we hold constant the mobilization delay and vary the rate at which cadre units are ready to deploy.

To explore the sensitivity of the results in Chapter Two to mobilization rate, we use the Long War Assignment Model (LWAM) to calculate the number of RC BCTs required under different assumptions about cadre mobilization rates and the DoD's willingness to stress the AC. Figure 7.4 shows how the number of RC units needed in the force varies with the cadre mobilization rate and the DoD's willingness to stress the AC.

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[94] See Paper II for a discussion of issues related to wartime recruiting and IRR activation.

[95] As of September 2007, the Army planned to accelerate the rate of expansion of six BCTs from five years to four years. [Cloud (2007)]

[96] The mobilization rate will depend on the structure of a cadre unit and the method chosen to fill out cadre units. See Paper II for more detail.

Figure 7.4—Sensitivity of RC BCTs Required in *CadreMix* Force to Cadre Mobilization Rate
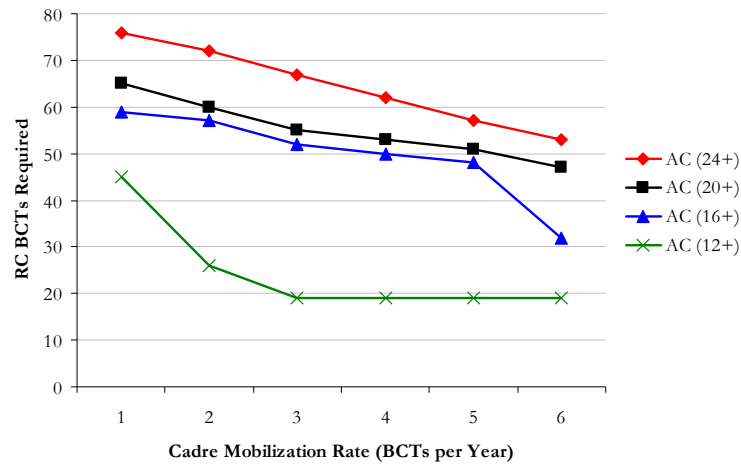
The higher the cadre mobilization rate, the fewer the number of RC BCTs that need to be maintained in the force no matter how strict the DoD is about AC rotation guidance. Therefore, the higher the cadre mobilization rate, the larger the cost savings from a cadre augmented force. The sensitivity of average long-run annual cost savings from a cadre augmented to the cadre mobilization rate is shown in Figure 7.5.[97]

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[97] The sensitivity of peacetime cost savings exhibits a similar trend.

**Figure 7.5—Sensitivity of Average Long-Run Cadre Cost Savings from *CadreMix*
Force to Cadre Mobilization Rate**
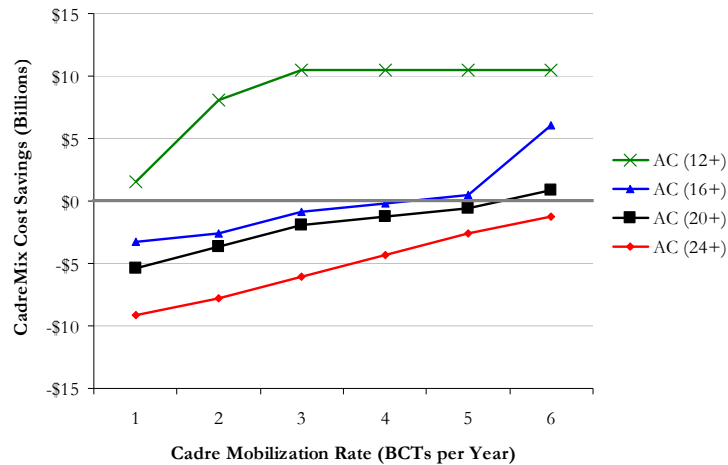
As the cadre mobilization rate increases, the cost savings from a cadre augmented

force increase. However, a cadre augmented force does not reduce costs under all sets of

assumptions. If AC units are allowed to deploy with as little as 12 months at home, a cadre

augmented force reduces costs no matter what the cadre mobilization rate. If AC units are

restricted to being deployed only after 16 months at home, a cadre augmented force only

reduces cost if the mobilization rate is higher than four BCTs per year. If AC units can only

be deployed with 20 or more months at home, a cadre augmented force only reduces cost if

the cadre mobilization rate is higher than five BCTs per year. Lastly, if the DoD restricts all

AC units to 24 months at home between deployments, a cadre augmented force never

reduces costs even if the mobilization rate is as high as six BCTs per year.

In summary, if the DoD is willing to allow some AC units to deploy with 12 months

at home while cadre units mobilize, a cadre augmented force still provides cost savings even

if the cadre mobilization rate is as low as one BCT per year.

7.1.3—Cadre Structure and Readiness

The readiness of a cadre unit will likely depend on the peacetime structure of that unit. The more leaders a unit retains in peacetime, the faster it can mobilize. If we were able to estimate the relationship between cadre structure and readiness, we could calculate a direct tradeoff between stress on the AC and the cost savings from a cadre augmented force, using the results in this section. However, it is difficult to estimate the relationship between cadre structure and readiness. Previous estimates of cadre readiness have been vague and there has been no attempt to estimate the relationship between the number of cadre leaders retained during peacetime and the time a cadre unit would require to prepare to deploy. We do not attempt to make such an estimate in this dissertation, but such an estimate would be extremely valuable in providing the DoD with the requisite data to determine the appropriate cadre unit structure based on how they weigh the cost savings from a cadre augmented force against stress on the AC.

7.2—RC READINESS

In response to ARFORGEN, the Army is attempting to reduce post-mobilization training for RC BCTs.[98] Reductions in RC post-mobilization training could reduce the cost savings from a cadre augmented force because fewer RC BCTs can be replaced with cadre BCTs.[99] Table 7.1 shows the effect of RC post-mobilization training time on the average long-run cost savings from trading RC units for cadre units.[100]

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[98] A Defense Science Board (DSB) report states: "The goal is to limit post-mobilization training to just 45 days allowing for 320 days of deployed 'boots on the ground' in country. [DSB (2007), p. 22]. Also see: Freedberg (2007).

[99] This calculation assumes that there is no additional pre-mobilization training cost for RC units.

[100] The sensitivity of peacetime cost savings is similar.

Table 7.1—Sensitivity of Average Long-Run Cost Savings from Trading X RC BCTs for Three Cadre BCTs to RC Post-Mobilization Training[101]

RC Post-Mob. Training (months)	X RC BCTs	Annual Savings
6	12	$3.0 billion
4	9	$1.9 billion
2	7	$1.2 billion
0	6	$0.9 billion

Reductions in post-mobilization training for RC units could decrease the cost savings from trading RC units for cadre units. However, the decrease in post-mobilization training for RC units will likely be balanced by increased pre-mobilization training, which will increase the relative cost of an RC unit in peacetime.[102] As long as RC units are activated for the same amount of time, the increased peacetime RC cost will cancel out the higher cost-effectiveness of the RC to make the cost savings from trading cadre for RC BCTs about the same as those calculated in Chapter Two.

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[101] See Appendix A for more on how to calculate the unit tradeoff factors.

[102] "The Deputy Commander of the First Army, the unit charged with managing the pre-mobilization training, indicated that at least two months of the former four-month training cycle would be shifted to the pre-mobilization year." [DSB (2007), p. 22]. Others estimate pre-mobilization training could increase as much as 25 percent for RC units [Freedberg (2007)].

8. CONCLUSION

In this paper, we have seen that a cadre augmented force can save billions of dollars annually without significantly increasing military risk. Although the magnitude of this result is sensitive to some of the underlying assumptions, over a wide range of assumptions, the cost savings are still very large. In the base case examined in Chapter Two, the *CadreMix* force reduced average long-run costs by $11 billion annually. Figure 8.1 summarizes how the average long-run cost savings from the *CadreMix* force vary over a wide range of parameters. The key sensitivities identified below are similar for the other cadre augmented forces examined in this paper and for peacetime cost savings.[103]

Figure 8.1—Average Long-Run Annual Cost Savings from *CadreMix* Force over a Range of Assumptions[104]

Parameter	Low		High	
Frequency of War	$12 B	15%	$10 B	50%
Cadre Peacetime Cost	$13 B	5%	$6 B	57%
Willingness to Stress AC	-$6 B	24 mo.	$11 B	12 mo.
AC Rotation Guidance	-$2 B	1:4	$11 B	1:2
Mobilization Delay	$11 B	12 mo.	$1 B	60 mo.
Mobilization Rate	$2 B	1 BCT/Yr	$11 B	6 BCT/Yr

The cost savings from a cadre augmented force are relatively insensitive to the assumed frequency of war and cadre peacetime cost. The key assumptions in determining

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[103] The peacetime savings will be slightly higher for each set of parameters but the general trend will be the same.

[104] The cells are colored to depict the attractiveness of a cadre augmented force. Green signifies a cadre augmented force is very attractive (large cost savings), yellow and orange signify that a cadre force is less attractive but still reduces cost, red signifies that a cadre augmented force *increases* cost relative to the baseline non-cadre force.

whether a cadre augmented force can significantly reduce cost are those about the DoD's

willingness to stress the AC while cadre units mobilize and the future rotation guidance for

the AC. If the DoD is unwilling to place some stress on AC units while cadre units mobilize

or if the AC is rotated less intensively in the future, a cadre augmented force could actually

increase annual costs. Assumptions about cadre readiness (delay and rate) are also important,

but a cadre augmented force reduces cost even under our worst-case assumptions for these

parameters.

Combinations of the extreme values for the various assumptions discussed above

could also lead to a cadre augmented force being less attractive. If the mobilization rate is

slower than assumed in this paper (less than three BCTs/year), then a cadre augmented force

will not decrease costs if either the peacetime cost of a cadre unit or the frequency of war is

high. The same is true for the mobilization delay. If it takes longer to mobilize cadre units

than assumed in this paper (36 months), then a cadre augmented force could increase cost if

either the peacetime cost of cadre a unit or the frequency of war is high. However, ceteris

paribus, a cadre augmented force continues to reduce costs even if both the peacetime cost

of cadre and the frequency of war are high.

There are two global assumptions that we did not address in the sensitivity analyses

in this paper. First, throughout this paper, we assume that force structure decisions are

driven by rotation. Second, we assume that the reserves are used as an operational, not

strategic, reserve. To conclude our budgetary analysis of a cadre augmented force we return

to these assumptions and discuss their implications for the results in this paper.

8.1—ROTATION AND LONG WARS

The relevance of the results in this paper depends on whether future force structure decisions will be driven by rotation. All of the analyses in this paper are based on the assumption that the ability to sustain rotation for long wars drives force structure decisions. In the introduction to this dissertation, we justified this assumption using quotations from the 2006 QDR and the Under Secretary of Defense for Policy. However, planning for rotation is a new force-planning paradigm and it has yet to be as widely accepted in the defense planning community as the two MRC force-sizing requirement was during the 1990s. One of the reasons for this is that some think the need to sustain large rotations is ephemeral, due to an over-emphasis on operations like those in Iraq and Afghanistan.[105] These individuals argue that the experiences in Iraq and Afghanistan will make the U.S. government reticent to engage in similar operations in the future. Others argue that long wars fought with rotation are *more* likely to occur in the future.[106] They argue that conventional war dominance has driven U.S. adversaries to asymmetric tactics and to strategies that lengthen wars by "winning by not losing,"[107] and that these types of wars require large numbers of troops deployed over the course of many years. Which of these viewpoints becomes predominant will determine whether the cadre augmented forces considered in this paper are worth considering. However, it is worth noting that force structure paradigms are not created solely based on requirements, they also consider cost. Those who would have opposed building a force structure to sustain rotation when force structure decisions were limited to only AC and RC units might reconsider when presented

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[105] Bender (2007a), Adams (2007a,b), Conetta (2007a), Friedman (2007), Arkin (2007)
[106] Donnelly and Kagan (2008b)
[107] Scales (2007)

with the alternative of a cadre augmented force. A cadre augmented force makes it less costly to hedge against long duration ground wars and therefore makes it more likely that the DoD may choose to do so.

8.2—OPERATIONAL VS. STRATEGIC RESERVE

A cadre augmented force can also affect the nature of reserve service. Before 2001, the RC had been primarily a strategic reserve, drilling two weekends a month plus two weeks a year and almost never being called up to deploy abroad.[108] Operations in Iraq and Afghanistan have required using RC forces as an operational reserve, deploying RC units more than once to fight the same war.[109] The desirability of an operational reserve is the subject of much debate.[110] Some argue that an operational reserve is not desirable because it places too much strain on the nation's citizen-soldiers by disrupting both their work and personal lives on a regular basis.[111] A cadre augmented force has the additional benefit that it could return the reserves from their operational role back to a strategic role.

For long wars fought with rotation, RC units could be deployed only in the first years of a war while cadre units are mobilizing but not thereafter as shown in Figure 8.2.

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[108] DSB (2007), p. 24; Freedberg (2007)
[109] Korb and Duggan (2007)
[110] Arnold Punaro, Chairman of the Commission on the National Guard and Reserves, is quoted as saying: "We have not had a national debate about whether or not we want an 'operational reserve.' We backed into it." [Freedberg (2007)]
[111] Korb and Bergmann (2007), p. 24.

Figure 8.2—A Strategic Reserve
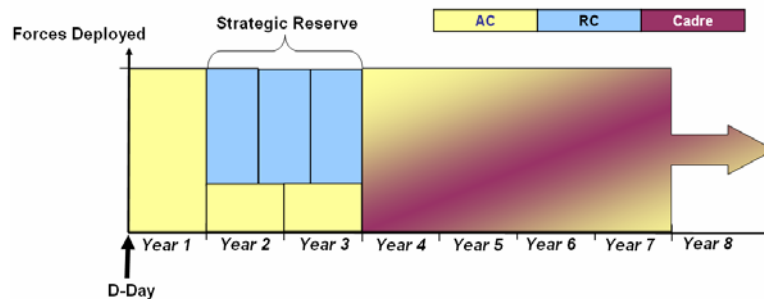
When RC units are used only as a strategic reserve, the force needs more AC or

cadre BCTs to sustain the same rotation. For a force with 28 RC BCTs, ten additional BCTs

are needed to allow the RC to serve as a strategic reserve. If ten AC BCTs were added to the

force, this would increase average long-run annual costs by about $11 billion per year. If

cadre BCTs were added instead, this would increase average long-run annual costs by only

$4 billion per year, a savings of about $7 billion annually. A cadre augmented force reduces

the cost barrier to returning the RC to their traditional strategic role, an alternative that the

army may consider in the future.[112]

8.3—A BROADER PERSPECTIVE

The results of this paper served as the impetus to explore cadre units in more depth.

The large cost savings make a cadre augmented force worth considering further.[113] However,

this paper only looked at budgetary issues. Many other issues need to be considered in a full

analysis of a cadre augmented force. We address many of these issues in Papers II and III of

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[112] The Commission on the National Guard and Reserves recommended in 2008 that the National Guard be tasked with only homeland security duties [CNGR (2008)]. Therefore, it is not unreasonable to think that others may consider returning the reserves to their traditional strategic role, a move that would be less drastic than removing *all* war fighting responsibilities from the National Guard.

[113] Though these costs savings come with increases in military risk; a tradeoff the DoD should carefully consider.

this dissertation. In Paper II, we explore different alternatives for structuring, organizing, and equipping cadre units in peacetime and activating, filling out, training, and demobilizing cadre units in wartime. We find that there are many alternatives, each of which can have a significant effect on the cost savings and risk from a cadre augmented force. The results from Paper II were used to inform many of the assumptions made in this paper. In Paper III, we provide a historical context for a cadre augmented force. Cadre forces are not new to U.S. Army force planning. Understanding the similarities and differences between the cadre force proposed in this paper and those that have been proposed in the past is important because there has always been significant opposition to cadre forces and anyone considering these ideas must be aware of these issues. Taken together, these three papers provide a broad perspective regarding the attractiveness of a cadre augmented force.

APPENDIX A—COST, TRADEOFF, AND STRESS CALCULATIONS

This appendix describes the calculations required to derive the results in the body of this paper. The first section shows how we calculate the *relative* cost of a unit from each force averaged over periods of peace and war. The second section shows how we calculate the *annual* cost of a unit from each force. The third section shows how we calculate the number of units needed to sustain one unit deployed from each force. The fourth section shows how we calculate stress on the AC. The final section shows how we calculate the cost savings from a cadre augmented force relative to a non-cadre force. For ease of presentation, we define all of the variables used in this appendix below.

- i: force index. 1= AC, 2=RC, 3=Cadre
- c_i: average per unit cost of force i
- m_i: mobilization length for force i
- p_i: post-mobilization training required for force i
- $d_i = m_i - p_i$: deployment length for force i
- h_i: "dwell time", time at home between deployments for force i
- $l_i = \dfrac{m_i}{m_i + h_i}$: percentage of time units in force i are mobilized in each cycle
- r_i: non-mobilized per unit cost of force i (mobilized cost assumed equal for all forces)
- α: fraction of time at "war" (equivalent to fraction of cycles "reserves" mobilized)

A.1—RELATIVE FORCE COSTS

The average long-run costs calculated in the body of this paper rely on relative unit cost calculations to compare different force structures. This appendix begins by deriving generic relative cost equations for each force and then plugs in "best estimates" to replicate

the calculations performed in the body of this paper.[114] Peacetime costs are much simpler to

estimate and are therefore ignored in this section.

We begin by deriving generic average long-run cost equations for each force, starting

with the Active Component (AC). Soldiers in AC units are always paid full-time whether

deployed or not. Therefore, the average per unit cost of an AC unit is equal to the non-

mobilized cost (which is the same as the mobilized cost).

$$c_1 = r_1$$

The average per unit cost of RC and cadre units depends on the number of cycles in

which they are mobilized (α) and the percentage of time within those cycles that they are

mobilized (l_i). The average cost of an RC unit is a weighted average of the wartime and

peacetime costs. The peacetime cost of an RC unit is equal to the non-mobilized cost of an

RC unit (r_2). The wartime cost of an RC unit is an average of the non-mobilized (r_2) and

mobilized (r_1)[115] costs weighted by the percentage of time in each cycle that a RC unit is

mobilized (l_2). Therefore, the average cost of an RC unit is:

$$c_2 = \alpha \left[r_1 * l_2 + (1 - l_2) * r_2 \right] + (1 - \alpha) * r_2$$

The average per unit cost of a cadre unit is also a weighted average of the wartime

and peacetime costs. The peacetime cost of a cadre unit is equal to the non-mobilized cost

of a cadre unit (r_3). The wartime cost of a cadre unit is an average of the non-mobilized (r_3)

and mobilized (r_1) costs weighted by the percentage of each cycle that a cadre unit is

mobilized (l_3). The average cost of a cadre unit is:

$$c_3 = \alpha \left[r_1 * l_3 + (1 - l_3) * r_3 \right] + (1 - \alpha) * r_3$$

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[114] See Klerman (2008), Appendix A for more discussion of calculating relative unit costs.
[115] We assume that all units have the same cost when mobilized.

We can simplify these equations by normalizing the mobilized cost of all units ($r_1=1$). The generic average cost of a unit from each force is shown in Table A.1.

Table A.1—Generic Unit Cost Equations

Force	Generic Average Unit Cost
AC (1)	$c_1 = 1$
RC (2)	$c_2 = \alpha\left[l_2 + (1-l_2)*r_2\right] + (1-\alpha)*r_2$
Cadre (3)	$c_3 = \alpha\left[l_3 + (1-l_3)*r_3\right] + (1-\alpha)*r_3$

If we assume that the DoD will follow the rotation guidance as of 2007 then we can simplify the cost equations above. Table A.2 shows the assumptions we made in the body of this paper for each of the rotation and cost parameters.

Table A.2—Rotation and Cost Parameters

Parameter	1. AC (1:2)	2. RC (1:5)	3. Cadre (1:2)
h_i	24 months	60 months	24 months
m_i	12 months	12 months	12 months
d_i	12 months	8 months ($p_i = 4$ months)	12 months
l_i	1/3	1/6	*Variable*
r_i	1.00	0.28	0.20

The percentage of time that cadre units are mobilized in wartime (l_3) depends on the number and readiness of cadre units. Under the readiness assumption made in the body of this paper[116] we calculated the percentage of time that cadre units are mobilized in each period of a war by multiplying the sum of the fraction of cadre units mobilized in each period (f_i)[117] by one over the number of periods (N):

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[116] We assumed a 36 month mobilization delay and a three BCT/year mobilization rate.

[117] We calculated the fraction of cadre units mobilized in each period over the course of a ten year war by dividing the number of cadre units at full personnel levels in each period by the total number of cadre units in the force.

$$l_3 = \frac{1}{N} \sum_{i=1}^{N} f_i$$

Table A.3 shows the fraction of time cadre units are mobilized over the course of a ten-year war for each of the four cadre augmented forces examined in this paper.

Table A.3—Fraction of Time Cadre Units Mobilized in Wartime

Force	l_3
+6 Cadre BCT	0.78
+9 Cadre BCT	0.73
+18 Cadre BCT	0.58
CadreMix	0.62

These calculations assume that all wars last ten years. These values will differ for wars of different lengths. We calculated l_3 for wars ranging in length from zero to thirty years in order to calculate the sensitivity of average long-run cost savings to the frequency of war in Chapter Three of this paper. Figure A.1 shows how l_3 varies for wars ranging in length from zero to thirty years for each of the cadre augmented forces analyzed in this paper. We assume a thirty-year time horizon in all of the analyses in this paper so the length of war is represented as a frequency.

Figure A.1—Sensitivity of l_3 to Frequency (Length) of Wars
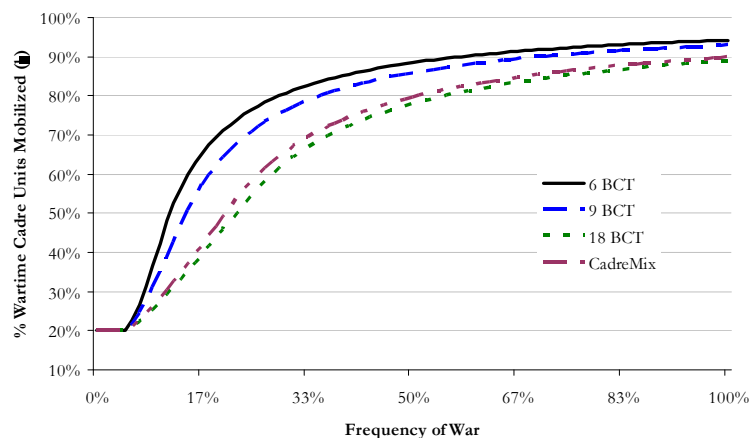
As wars get longer, l_3 increases for each of the cadre augmented forces because *all* cadre units are mobilized for a larger fraction of the time. The rate of increase is larger for larger cadre forces because in the limit, when wars occur 100 percent of the time, l_3 will approach 100 percent for all cadre forces.

Table A.4 shows the unit cost equations when we substitute the rotation and cost parameters in Table A.2 and the fraction of time cadre units are mobilized over the course of a ten-year war for the *+6 Cadre* force.

Table A.4—Unit Cost Equations for *+6 Cadre* Force

Force	Average Per Unit Cost
AC (1)	$c_1 = 1$
RC (2)	$c_2 = \alpha * 0.40 + (1-\alpha) * 0.28$
Cadre (3)	$c_3 = \alpha * 0.83 + (1-\alpha) * 0.20$

If we make an assumption about the frequency of wars, we can use the cost equations above to calculate the relative cost of any force. In Chapter Two of this paper, we assumed that wars occur 33 percent of the time. Under this assumption, the average cost of one cadre (RC) BCT in the *+6 Cadre* force relative to an AC BCT is 41 percent (32 percent).[118]

A.2—ANNUAL COST PER BCT

The annual cost estimates for AC and RC BCTs used in the body of this paper are derived from two sources: CBO (2007a) and Jaffe (2006). CBO (2007a) estimates the annual cost of an active duty soldier at $111,000.[119] For simplicity, we assume that each active duty

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[118] The relative cost of a RC BCT does not vary with the size of the force.
[119] This estimate is a sum of personnel costs ($65,000 per year), health care costs ($13,000 per year), and operations and maintenance costs ($33,000 per year).

soldier costs $100,000 per year. It is likely the actual cost is not exactly $100,000[120], but the order of magnitude is correct, which is all that matters to calculate the magnitude of the cost savings from a cadre augmented force. Jaffe (2006) estimates the relative cost of a reserve soldier to an active duty soldier to be 28 percent. The following sections describe how we use this estimate to calculate the annual cost savings from trading AC and RC BCTs for cadre BCTs. Equipment costs are not considered in this paper, but are discussed in the second paper of this dissertation.

A.2.1—The Cost of Trading AC BCTs for Cadre BCTs

To calculate the annual cost of an AC BCT, we multiply the cost of an active duty soldier by the number of soldiers required to increase the size of the force by one BCT. The expansion of six BCTs required 65,000 personnel. This means expanding the force by one BCT requires 10,833 soldiers. The actual number of personnel assigned to a BCT is only around four thousand.[121] The remaining soldiers are required for support units such as Combat Support (CS) and Combat Service Support (CSS). The ratio of deployed combat forces to support forces is usually about 1:1.6.[122] This estimate is consistent with this ratio, though slightly higher. If we assume the number of soldiers needed to field and support a BCT is 10,833, then the annual cost of an AC BCT with support is $1.08 billion per year.

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[120] New York Times Editorial Board (2006) estimates the cost of an active duty soldier to be $150,000 and Jaffe (2006) estimates the cost to be $120,000. These higher estimates would lead to larger cost savings from a cadre augmented force. Donnelly and Kagan (2008b) estimate the cost of expanding the Army by one soldier to be $275,000, though this includes the costs of the army "raised, trained, and equipped according to its doctrine." [Donnelly and Kagan (2008b), p. 140-141]. The costs in this paper do not include equipment.
[121] See Appendix A of Paper II.
[122] Williams (2001), p. 195, Fastabend (1997). The ratio of support to combat personnel in conflicts since World War I: World War II (1.7 to 1), Korean War (1.5 to 1), Vietnam War (1.8 to 1), Persian Gulf War (1.4 to 1). [CBO(1997), p. 10]

Other public sources have estimated the annual cost of an AC BCT at $1.2 billion.[123] Using the $1.08 billion estimate provides a conservative analysis of the cost savings from a cadre augmented force.

In the body of this paper, we use this estimate for the cost of an AC BCT to calculate the cost savings from trading AC BCTs for cadre BCTs averaged over periods of peace and war and in peacetime. In Section A.1, we calculated that the average long-run cost of a cadre BCT in the *+6 Cadre* force when wars occur 33 percent of the time is 41 percent of an AC BCT. If an AC BCT costs $1.08 billion per year, then the average long-run cost of a cadre BCT in the *+6 Cadre* force is $443 million per year, $637 million less than an AC BCT. Therefore, trading six cadre BCT for six AC BCT reduces average long run cost by about $4 billion annually (6*$637 million). Under the same assumptions, the annual peacetime cost of a cadre BCT is $216 million, $864 million less than an AC BCT. Therefore, trading six AC BCTs for six cadre BCTs during peacetime reduces annual costs by about $5 billion (6*$864 million). Cost savings for other cadre for AC tradeoffs were calculated similarly.

A.2.2—The Cost of Trading RC BCTs for Cadre BCTs

In the main body of this report, we assumed that an RC BCT costs 28 percent of an AC BCT during peacetime. This is a rough estimate based on Jaffe (2006). Jaffe (2006) estimated the cost of an RC soldier to be 22 percent of an AC soldier in 2001 and 28 percent in 2006. This is in the middle of the range of previous estimates. Reischauer (1990) estimated that an Army National Guard heavy unit based in the United States costs 20 percent of an

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[123] New York Times Editorial Board (2006) and IISS (2007)

active heavy division in Europe.[124] DoD (1990) estimated the cost of a RC combat (combat support) division relative to an AC division to be 26 percent (25 percent).[125] CBO (1992) estimated the cost of a heavy Army National Guard division relative to a heavy active division to be 25 percent.[126] Palmer et al (1992) estimated the relative cost of RC/AC heavy and light divisions at 23 and 25 percent respectively.[127] Since Jaffe (2006) provides the most recent estimate, we chose to use this estimate.[128]

Assuming the cost of an RC BCT relative to an AC BCT in peacetime is 28 percent, we can calculate the average long-run and peacetime annual cost of an RC BCT. In Section A.2.1, we calculated the annual cost of an AC BCT to be $1.08 billion. Therefore, the peacetime annual cost of a RC BCT is $302 million (0.28*$1.08 billion). If we assume that wars occur 33 percent of the time, then we find that an RC unit costs 32 percent of an AC unit averaged over periods of peace and war. Under these assumptions, the average long-run cost of an RC BCT is $346 million. This is an average of the peacetime cost ($302 million) and the wartime cost ($432 million) of an RC BCT when wars occur 33 percent of the time.

In Chapter Two, we used these cost estimates for an RC unit to calculate the average long-run and peacetime cost savings from trading nine RC BCTs for three cadre BCTs. In Section A.2.1, we calculated the annual average long-run cost of a cadre unit to be $443 million and the peacetime cost of a cadre unit to be $216 million per year. When wars occur 33 percent of the time, trading nine RC BCTs (9*$346 million) for three cadre BCTs (3*$443 million) would reduce average long-run costs by about $1.8 billion annually. In peacetime,

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[124] Reischauer (1990), p. 31
[125] DoD (1990), p. 41
[126] CBO (1992), p. 7
[127] Palmer et al (1992)
[128] It is also based on data provided by the U.S. Army.

trading nine RC BCTs (9*$302 million) for three cadre BCTs (3*$216 million) would save about $2.0 billion per year.

A.3—NUMBER OF UNITS PER DEPLOYED BCT

The previous sections calculated the cost of a unit from each force. In order to examine force structure tradeoffs for rotation, we also need to know the number of units from each force that can support one unit deployed overseas. We call this the number of units per deployed BCT.[129] This calculation requires that we make an assumption about the rotation guidance and post-mobilization training time for each force. We define the number of units per deployed BCT for force i as B_i. This parameter is calculated by dividing the sum of dwell time and mobilization length by the deployment length (mobilization length minus post-mobilization training) as shown below.

$$B_i = \frac{h_i + m_i}{d_i} = \frac{h_i + m_i}{m_i - p_i}$$

Under the assumptions about rotation guidance made in the body of this paper (see Table A.2), B_1 and B_3 are equal to three and B_2 is equal to nine as shown in Table A.5.

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[129] Klerman (2008) calls this the number of units in the force per unit boots-on-the-ground. These terms are interchangeable [See Klerman (2008), Appendix A].

Table A.5—Number of Units Per Deployed BCT

Force	Number of Units per Deployed BCT
AC (1)	$B_1 = \dfrac{24+12}{12-0} = 3$
RC (2)	$B_2 = \dfrac{60+12}{12-4} = 9$
Cadre (3)	$B_3 = \dfrac{24+12}{12-0} = 3$

A.4—AC STRESS

In the main body of this paper we showed that even though we allowed a cadre augmented force to deploy AC units with as little as one year at home while cadre units mobilize, very few units are actually deployed with less than two years at home. This section shows how we calculated the percentage of AC units deployed with less than two years at home.

We use the Long War Assignment Model (LWAM) to calculate the number of AC units deployed with less than two years at home during wartime.[130] The LWAM calculates the number of units deployed from each time-step at home since their last deployment. For the analyses carried out in this paper, we defined time-steps as trimesters. Therefore, the LWAM measured the number of units deployed from every trimester at home since their last deployment. The LWAM then divides this number by the total number of AC units deployed over the given time horizon to determine the percentage of AC units deployed with less than two years at home *during wartime*. We combine these wartime values with an assumption about the peacetime deployments of AC units to calculate the percentage of AC units deployed with less than two years at home over the long term.

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[130] See Appendix B for more detail on the LWAM.

In the analyses contained in this paper, we assume that wars last on average ten years. Therefore, we set the time horizon of the LWAM to ten years (30 trimesters). For each force and requirement, we then simulated the deployment and extracted the percentage of AC units deployed with 24+, 20, 16, and 12 months at home. We then multiplied the percentage of wartime deployments for each of these dwell times by the frequency of war (α) to determine the percentage of AC units deployed with less than two years at home over the long-term. Then, we calculated the percentage of units deployed with more than 24 months at home over the long-term by multiplying the percentage of units deployed with 24+ months at home in wartime (calculated with the LWAM) by α and adding $(1-\alpha)$ to this value. This is based on the assumption that during peacetime all AC units get a full two years (24+ months) at home.[131] These calculations are shown in Table A.6.

Table A.6—Generic AC Stress Calculations

	Dwell Time (months)			
	12	*16*	*20*	*24+*
Wartime LWAM Data (% of deployments)	A	B	C	D
% Long Term Deployments	$\alpha * A$	$\alpha * B$	$\alpha * C$	$\alpha * D + (1- \alpha)$

In Chapter Two, we assumed that wars occur 33 percent of the time. Table A.7 shows the calculations of AC stress for the *CadreMix* force.

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[131] It is likely that AC units will have more than two years at home between deployments during peacetime. Under ARFORGEN they would have *at least* two years at home.

Table A.7—AC Stress Calculations for *CadreMix* Force

	Dwell Time			
	12	*16*	*20*	*24+*
Wartime LWAM Data (% of deployments)	18%	12%	22%	49%
Calculation	0.33*0.18	0.33*0.12	0.33*0.22	0.33*0.49 + 0.66
% Long Term Deployments	6%	4%	7%	83%

We calculate long-term stress on the AC in the same manner for all other forces analyzed in this paper.

A.5—CADRE COST SAVINGS RELATIVE TO BASELINE

In Section 2.4, we calculated the peacetime and average long-run cost savings from cadre relative to the corresponding non-cadre forces that could sustain the same size rotation. Figure A.2 shows how these calculations were performed.

Figure A.2—Relative Cadre Cost Savings Calculations

	AC BCTs	RC BCTs	Cadre BCTs	Peacetime Cost	Average Long Run Cost
Baseine Forces					
+6	48	28	0	$60 billion	$62 billion
+9	51	28	0	$64 billion	$65 billion
+18	60	28	0	$73 billion	$74 billion
CadreMix	48	28	0	$60 billion	$62 billion
Cadre Forces					
+6	42	28	6	$55 billion	$58 billion
+9	42	28	9	$56 billion	$59 billion
+18	42	28	18	$57 billion	$62 billion
CadreMix	35	19	16	$47 billion	$51 billion
Difference					
+6	-6	0	+6	-$5 billion	-$4 billion
+9	-9	0	+9	-$8 billion	-$6 billion
+18	-18	0	+18	-$16 billion	-$12 billion
CadreMix	-13	-9	+16	-$13 billion	-$11 billion
Cadre Difference Relaitve to Baseline					
+6	-13%	0%	-	9%	6%
+9	-18%	0%	-	12%	9%
+18	-30%	0%	-	21%	16%
CadreMix	-27%	-32%	-	22%	17%

First, we calculated the peacetime and average long-run cost of each of the baseline and cadre forces as discussed in the previous sections. Second, we calculated the difference in cost between each cadre force and its corresponding baseline force. Lastly, we divided the difference in cost (in all cases- cost savings) by the cost of the corresponding baseline force to calculate the cost savings of cadre relative to the overall cost of the force. It is worth noting that all cost estimates are restricted to estimates of personnel and operations and maintenance (O&M) costs. The actual Army budget in any period of peace or averaged over periods of peace and war would be significantly larger as it includes other costs such as research and development and procurement.[132] However, since the cost of a marginal unit in the force is determined mainly by personnel and O&M costs, restricting our analysis to these costs is appropriate.

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[132] This is especially true for periods of war when the size of the Army budget may increase significantly over peacetime levels. In this analysis, we assume that the only increase in the baseline personnel and O&M budget during wartime is the cost of activation (increase from part-time to full-time pay and increase in O&M costs) of reserve forces.

APPENDIX B—THE LONG WAR ASSIGNMENT MODEL

The Long War Assignment Model (LWAM) was designed to perform the analyses in this paper. We used it to calculate stress on the AC and to examine the effect of allowing some AC units to break rotation guidance on the cost savings from a cadre augmented force. The LWAM is a simplification of a more generic model: the RAND SLAM program, which is described in Klerman et al (2008) and used in Appendix C to validate the results in this paper.[133] A new model was required because the RAND SLAM program has trouble modeling cadre units and requires a prohibitive amount of time to perform the analyses in this paper. This appendix provides detail on the technical implementation of the LWAM. The first section describes how the LWAM simulates deployments. The second section describes the Cadre Force Optimizer, which we used to determine the smallest feasible cadre augmented force for a given set of assumptions. The final section discusses LWAM modeling issues.

B.1—SIMULATING DEPLOYMENTS

The main feature of the LWAM is its ability to simulate the deployment of forces over time. The LWAM takes a time-series demand for deployed forces and a set of force use policies specified by the user and deploys forces according to an assignment algorithm. The following sections describe how the LWAM simulates deployments. The first section describes the resolution of the LWAM. The second section discusses the inputs required for the LWAM. The third section describes how to execute the LWAM and explains how the force assignment algorithm works. The final section describes the model outputs.

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[133] The LWAM was built in Microsoft Excel using Visual Basic for Applications.

Figure B.1 shows the LWAM main screen. The user specifies all input parameters on this screen and then executes components of the LWAM by clicking on the buttons on the right.

Figure B.1—LWAM Input Screen

Time-step / Unit of Analysis	
Periods in a Year	3
Unit of Analysis	BCT

Demand for Deployed Forces		
Low Demand	0	
# Periods Low	1	**1. Create Datasheet for Demand and Cadre Readiness**
High Demand	19	
# Periods High	30	
# Periods for TPD Graph	24	

Cadre Readiness		
First Period Cadre Units are Ready	11	
Total Number of Cadre Units	6	**2. Generate Cadre**
Cadre Ready Per Period (Rate)	1	

AC/RC Supply: Readiness / Use Policies		
Reserves		
# BCTs	28	**3. Create Force Allocation Datasheet**
Mobilization Length	3	
Post-Mobilization Train-up Time	1	
Time Home Between Deployments	15	**4. Assign Forces**
Actives		
# BCTs	42	
Deployment Length	3	**5. TPD Graph**
Min Time Home Between Deployments	3	
Assignment Ordering		
Min AC Time @ Home Before Use Reserves	6	***Cadre Force Optimizer***
Initial Distribution Uniform	0	

B.1.1—Model Resolution

The LWAM requires that the user specify two model resolution parameters: time-step and unit of analysis. The time step for the simulations in this paper is a trimester. We use trimesters because we assume that RC units require four months (one trimester) of post-mobilization training. The unit of analysis for the simulations used in this paper is the Army Brigade Combat Team (BCT). These parameters are specified at the top of the LWAM input screen as shown in Figure B.2.

Figure B.2—Specifying Model Resolution

Time-step / Unit of Analysis	
Periods in a Year	3
Unit of Analysis	BCT

The time step is specified by entering the number of periods in a year (three for

trimesters). This parameter is used to create the force allocation datasheet, which is discussed

in Section B.1.3. The unit of analysis is included as a reminder to the user and is not used by

the LWAM. The LWAM is capable of using any time-step and unit of analysis. However, the

user must be consistent with these definitions within a simulation.

B.1.2—Inputs

The LWAM requires two sets of inputs: demand and supply. The demand inputs

specify how many deployed units are required in each time period. For each force, the supply

inputs specify: the number of units in each force, the mobilization frequency/duration, and

post-mobilization training.

Demand for Deployed Forces

The demand for deployed forces is generated from a set of four parameters. The

inputs shown in Figure B.3 determine the demand for deployed forces over time.

Figure B.3—Specifying the Demand for Deployed Forces

Demand for Deployed Forces	
Low Demand	0
# Periods Low	1
High Demand	19
# Periods High	30
# Periods for TPD Graph	24

The LWAM can model any possible demand for deployed forces. However, the

analyses in this paper focus on long wars in which the demand for deployed forces remains

constant over the course of the war. The inputs to the model were specified to simulate this

type of demand. The user must first specify a low demand for the periods before a war breaks out. This helps determine the initial condition of forces when a war occurs. For all the analyses carried out in the body of this paper, we assume a low demand of zero. Second, the user must specify the number of periods in the low demand state. For all of the analyses carried out in this paper, we assume low demand lasts one period so that we can specify an initial distribution of units in the period immediately before a war begins. Next, we specify the constant demand for forces during wartime, which is labeled high demand. This parameter is varied for different analyses carried out in the main body of the paper.[134] Next, we specify the number of periods that the war will last. For the analyses in this paper, we assume that wars last on average ten years (30 trimesters). Lastly, we specify the number of periods for the for the Time-phased deployment (TPD) graph. This graph is discussed in the outputs subsection.

Supply of Forces

The supply of forces available to be deployed in any given period is determined by the deployment restrictions and readiness specified for each force by the user. The parameters specifying the supply of forces are split into two sections. The first section specifies the readiness of cadre units. The second section specifies the readiness and usage parameters for AC and RC units.

The user of the LWAM must specify three inputs for cadre readiness. These inputs are shown in Figure B.4.

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[134] The wartime demand for the analyses performed in this paper was set to the highest integer level of demand that the force structure could sustain over the long term. For instance, a force with 42 AC, 28 RC, and 6 cadre BCTs can sustain 19.1 BCTs deployed so the wartime demand was set to 19 BCTs.

Figure B.4—Specifying the Readiness of Cadre Units

Cadre Readiness	
First Period Cadre Units are Ready	11
Total Number of Cadre Units	6
Cadre Ready Per Period (Rate)	1

First, the user must specify how soon the first cadre unit is ready to deploy. For the analyses in Chapter Two, we assumed that the first cadre unit was ready to deploy 36 months after the beginning of a war (11 trimesters after the beginning of the simulation). Second, the user must specify the total number of cadre units available. Lastly, the user must specify the rate of cadre readiness. For the analyses in Chapter Two, we assumed that cadre units are ready to deploy at a rate of one BCT per trimester (three BCTs per year).

The second section of supply inputs determines the readiness and usage restrictions on AC and RC forces. Figure B.5 shows these inputs.

Figure B.5—Specifying the Supply of AC/RC Units

AC/RC Supply: Readiness / Use Policies	
Reserves	
# BCTs	28
Mobilization Length	3
Post-Mobilization Train-up Time	1
Time Home Between Deployments	15
Actives	
# BCTs	42
Deployment Length	3
Min Time Home Between Deployments	3
Assignment Ordering	
Min AC Time @ Home Before Use Reserves	6
Initial Distribution Uniform	0

Four input parameters are needed for both the AC and the RC. First, the user must specify the number of AC and RC BCTs in each force. Second, the user must specify the deployment (for the AC) and mobilization (for the RC) lengths. For the analyses in this paper, we always assume that RC units are mobilized for one year and AC units are deployed

for one year. Third, the user must specify the post-mobilization training time for RC units.[135] The analyses in this paper assume that RC units require four months (one trimester) of post-mobilization training. Lastly, the user must specify dwell time for each force. For each force, the user must specify the minimum number of periods at home a unit must have had before being redeployed. The analyses in this paper assume that RC units require five years (15 trimesters) at home between deployments while AC units can be deployed after as little as one year (three trimesters) at home.

The final supply inputs required from the user specify the order in which to use forces and the initial distribution of forces at the beginning of a war. First, the user must specify the minimum AC time at home before reserve units are deployed. In all of the analyses in this paper, we assume that RC units are deployed only when there are no AC units at home longer than two years (six trimesters). The last input needed from the user specifies the initial condition of AC units at the beginning of a war.[136] The LWAM provides two options: uniform or fully rested.[137] All of the analyses in this paper assume AC units are fully rested (home two or more years). By placing a one in the box next to "Initial Distribution Uniform," the user can specify that AC units be uniformly distributed at the beginning of a war. Table B.1 shows a uniform distribution of AC forces for a force with 42 AC BCTs and a peacetime requirement of nine BCTs.

Table B.1—Pre-War Distribution of AC Forces

	Deployed (months)			Home (months)										
State	**0**	**4**	**8**	**0**	**4**	**8**	**12**	**16**	**20**	**24**	**28**	**32**	**36**	**40**
AC BCTs	3	3	3	3	3	3	3	3	3	3	3	3	3	3

_____

[135] The model is hard-coded to assume that AC units require no post-mobilization training.

[136] We assume that all RC units are fully rested (five or more years at home) at the beginning of a war.

[137] The user can also specify their own initial distribution on the force allocation datasheet before assigning forces.

The effect of assuming a uniform distribution of forces on the attractiveness of a cadre augmented force is examined in Appendix C.

B.1.3—Executing the LWAM

This section describes how to use the LWAM to simulate deployments. The user executes the model by clicking on a series of buttons on the right of the input screen shown in Figure B.6.

Figure B.6—Executing the LWAM

The Force Demand Datasheet and Cadre Readiness

The user initializes the model by clicking on *1. Create Datasheet for Demand and Cadre Readiness*. This creates a new worksheet that specifies the demand for deployed forces based on the user inputs. This worksheet also leaves a blank column to specify cadre readiness. Figure B.7 shows the force demand datasheet for the first 12 trimesters.

Figure B.7—Force Demand Datasheet

Time Period	Demand (BCTs)	% Active	Cadre Ready
1	0	0%	0
2	19	100%	0
3	19	0%	0
4	19	0%	0
5	19	0%	0
6	19	0%	0
7	19	0%	0
8	19	0%	0
9	19	0%	0
10	19	0%	0
11	19	0%	0
12	19	0%	0
13	19	0%	0
14	19	0%	0

The force demand datasheet generates the demand for deployed forces in each period up to the specified length of war. The first period in the force demand datasheet is peacetime. For the demand shown here, we assume the peacetime requirement is zero. Period two is the beginning of war. We assume that only AC forces can be deployed in the first period so the model automatically specifies that the demand of 19 BCTs in period one must be met by 100 percent AC forces. For periods three through thirty, the force demand datasheet is populated with a demand of 19 BCTs in each period with no minimum requirement for AC units. The demand generated by clicking *1. Create Datasheet for Demand and Cadre Readiness* is tailored to studying long wars. The user can input any demand in the force demand datasheet and use the LWAM to simulate deployments.

The last column in the force demand datasheet is for cadre readiness. The user can either enter cadre readiness directly into the force demand datasheet or click on the *2. Generate Cadre* button. This button generates the readiness of cadre specified on the LWAM input screen. Figure B.8 shows the result of generating six cadre units beginning 36 months after D-day at a rate of one BCT per trimester.

Figure B.8—Cadre Readiness

Time Period	Demand (BCTs)	% Active	Cadre Ready
1	9	0%	0
2	19	100%	0
3	19	0%	0
4	19	0%	0
5	19	0%	0
6	19	0%	0
7	19	0%	0
8	19	0%	0
9	19	0%	0
10	19	0%	0
11	19	0%	1
12	19	0%	1
13	19	0%	1
14	19	0%	1
15	19	0%	1
16	19	0%	1
17	19	0%	0

The Force Allocation Datasheet

The next step in simulating deployments is to create the force allocation datasheet. This datasheet takes the inputs specified by the user and creates a new worksheet that models the constraints on the deployment of forces. Figure B.9 shows the layout of the force allocation datasheet.

Figure B.9—Layout of Force Allocation Datasheet
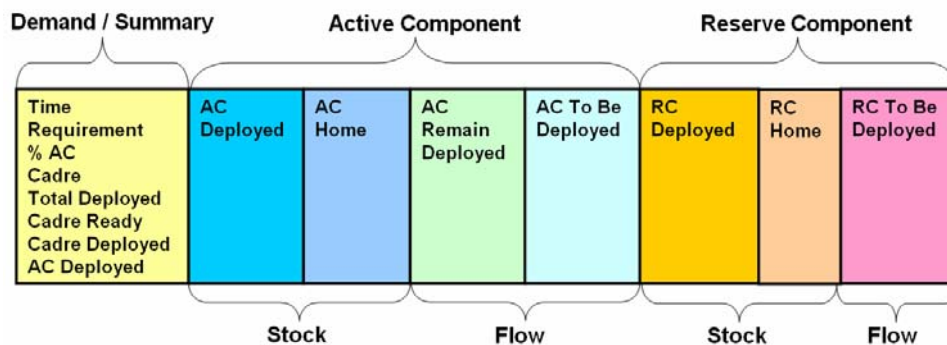
The first group of columns on the far left of the force allocation datasheet specifies the demand and summarizes deployments. This group includes eight columns listed on the far left in Figure B.9. The first four columns (*Time*, *Requirement*, *% AC*, *Cadre*) are copied

directly from the force demand datasheet shown in Figure B.7 . The total deployed column keeps track of the total number of units deployed in each period, which we define as *TotalDep(t)*. The cadre ready column keeps track of the number of cadre units ready to deploy in each period, which we define as *CadreReady(t)*. The cadre deployed column specifies the number of cadre units that are assigned to be deployed in a given period, which we define as *CadreDep(t)*. Lastly, the AC deployed column keeps track of the number of AC units deployed in a given period, which we define as *ACDep(t)*.

There are four groups of columns that specify the *stock* of AC and RC units home and deployed and constrain the movement of units over time. The *Deployed* group specifies the stock of units deployed. For the AC, the number of columns in this group is determined by the AC deployment length specified by the user, which we define as *ACMaxD*. The number of columns in the RC deployed group is equal to the length of deployment minus the number of periods required for post-mobilization training, which we define as *RCMaxD*.

The *Home* group specifies the number of units at home. The number of columns in AC home is determined by the peacetime requirement and the number of AC units specified by the user, which we define as *ACMaxH*. The number of columns in RC Home is equal to the RC dwell time plus the post-mobilization training requirement, which we define as *RCMaxH*. This ensures that an RC unit is at home for at least the specified dwell time plus post-mobilization training before being redeployed. The AC and RC stock sections of the force allocation datasheet are shown in Figure B.10.

Figure B.10—Stock Variables

AC Deployed			AC Home Stock												
1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	
															42
0	0	0	0	0	0	0	0	0	0	0	0	0	0	42
0	0	0	0	0	0	0	0	0	0	0	0	0	0	42
0	0	0	0	0	0	0	0	0	0	0	0	0	0	42

RC Deployed	RC Home															
1	2	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
																	28
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	28
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	28
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	28

The flow sections of the force allocation datasheet look very similar. For the AC, there are columns to redeploy AC units already deployed (*ACMaxD* columns) and columns to deploy AC units at home (*ACMaxH* columns). For the RC, there are only columns to deploy RC units at home since the model does not allow the redeployment of RC units that are already deployed. The flow sections of the force allocation datasheet are initially empty and are then populated by the force assignment algorithm. Figure B.11 shows the flow sections of the force allocation datasheet before forces are assigned.

Figure B.11—Flow Variables before Assignment

AC to be Redeployed			AC To Be Deployed										
1	2	3	1	2	3	4	5	6	7	8	9	10	11	12

RC to be Deployed																
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17

Constraints on Unit Status

The stock sections of the force allocation datasheet constrain how units change status over time. For instance, a unit home for three periods in this period should be home

for four periods in the next period if it is not deployed. In order to formalize these

relationships, we must define the two types of variables: stock and flow. We define the stock

of units in any given period as S(f,c,i,t) where f represents force type (AC/RC), c represents

the status of a unit ([H]ome/[D]eployed), i represents how long a unit has been in the

current state, and t represents the time period. We define the flow of units as X(f,c,i,t). Using

these definitions, we can formalize the constraints on the movement of AC units.

Units Deployed for One Period

The number of units deployed for one period is equal to the sum of the number of

units deployed in that period. For the AC, this is defined as the number of cadre units

deployed in that period plus the number of AC units deployed (from at home and

deployed).[138] This is formalized as:

$$S(AC,D,1,t) = CadreDep(t) + \sum_{i=1}^{ACMaxD} X(AC,D,i,t) + \sum_{i=1}^{ACMaxH} X(AC,H,i,t)$$

For RC units, the stock of units deployed for one period is simply equal to the sum

of those deployed from at home (because the model assumes RC units can only be deployed

from home):

$$S(RC,D,1,t) = \sum_{i=1}^{RCMaxH} X(RC,H,i,t)$$

Units Deployed More than One Period

---

[138] Deployed cadre units can only be in one state defined as *CadreDep* for their initial deployment. After being deployed for the first time, all cadre units are integrated into the AC force and deployed accordingly.

The stock of AC units deployed for more than one period is equal to the number of AC units deployed one less period in the last time period minus the number of AC units that are redeployed. This is formalized as:

$$\forall i > 1: \ S(AC,D,i,t) = S(AC,D,i\text{-}1,t\text{-}1) \text{-} X(AC,D,i,t)$$

The stock of RC units deployed for more than one period is just equal to the number of RC units deployed one less period in the last time-period because the model assumes that RC units can only be deployed from home. This is formalized as:

$$\forall i > 1: \ S(RC,D,i,t) = S(RC,D,i\text{-}1,t\text{-}1)$$

Units Home for One Period

The stock of AC units at home for one period is equal to the number of units in the last period of deployment in the last time period minus the sum of the number of units deployed with one period at home and the number of units redeployed from the last period of deployment:

$$S(AC,H,1,t) = S(AC,D,\mathit{ACMaxD},t\text{-}1) \text{-} X(AC,H,1,t) \text{-} X(AC,D,\mathit{ACMaxD},t)$$

The stock of RC units at home for one period is equal to the number of units in the last period of deployment in the last time-period minus the number of RC units deployed with one period at home:

$$S(RC,H,1,t) = S(RC,D,\mathit{RCMaxD},t\text{-}1) \text{-} X(RC,H,1,t)$$

Units Home More than One Period But less than Maximum

The number of AC and RC units at home for more than one period, but less than the maximum number of periods is equal to the number of units at home for one less period

in the previous time period minus the number of units assigned to deployment from the given number of periods at home. For both the AC and the RC, these are formalized as:

$$\forall 1 < i < ACMaxH: S(AC,H,i,t) = S(AC,H,i-1,t-1) - X(AC,H,i,t)$$

$$\forall 1 < i < RCMaxH: S(RC,H,i,t) = S(RC,H,i-1,t-1) - X(RC,H,i,t)$$

Units Home Maximum Number of Periods

Lastly, we define the stock of units home for the maximum number of periods. For both the AC and the RC, this is equal to the number of units at home one less period in the last period plus the number of units home the maximum number of periods in the last period minus the number of units deployed with the maximum number of periods at home. For both the AC and the RC, this is formalized as:

$$S(AC,H,ACMaxH,t) = S(AC,H,i-1,t-1) + S(AC,H,ACMaxH,t-1) - X(AC,H,ACMaxH,t)$$

$$S(RC,H,RCMaxH,t) = S(RC,H,i-1,t-1) + S(RC,H,RCMaxH,t-1) - X(RC,H,RCMaxH,t)$$

The equations above define all of the cells in the force allocation datasheet. There are two more parameters needed as inputs to the force assignment algorithm: the total number of units deployed [*TotalDep(t)*] and the number of AC units deployed [*ACDep(t)*] in each period. These are defined as:

$$TotalDep(t) = \sum_{i=1}^{ACMaxD} S(AC,D,i,t) + \sum_{i=1}^{RCMaxD} S(RC,D,i,t)$$

$$ACDep(t) = \sum_{i=1}^{ACMaxD} S(AC,D,i,t)$$

The force allocation datasheet will include the default initial conditions for the distribution of forces in the period before a war. The analyses in the body of this paper

assumed that all units were at home the maximum number of periods. Figure B.10 shows the

initial distribution of units for this analysis. If we chose the uniform distribution instead (see

Appendix C), the stock of AC forces in the force allocation datasheet is shown in Figure

B.12.

Figure B.12—Uniform Initial Distribution

AC Deployed			AC Home Stock											
1	2	3	1	2	3	4	5	6	7	8	9	10	11	12
3	3	3	3	3	3	3	3	3	3	3	3	3	3	0
0	3	3	3	3	3	3	3	3	3	3	3	3	3	3
0	0	3	3	3	3	3	3	3	3	3	3	3	3	6
0	0	0	3	3	3	3	3	3	3	3	3	3	3	9
0	0	0	0	3	3	3	3	3	3	3	3	3	3	12

The user also has the option of changing the initial distribution of forces before

executing the assignment algorithm.

The Force Assignment Algorithm

After creating the force allocation datasheet, the user can simulate the deployment of

forces by clicking on the *4. Assign Forces* button. The force assignment algorithm will deploy

forces in the order specified by the user to meet the requirements for deployed forces (both

AC and total) in each period.

The assignment algorithm begins by trying to meet the requirement for AC forces in

each period. The algorithm starts by looking for and deploying cadre units. If there are cadre

units ready to deploy (*CadreReady(t)*>0) and the number of AC units deployed (*ACDep(t)*) is

less than the number of AC units required ([*%AC(t)*]*[*requirement(t)*]), then the algorithm will

deploy as many cadre units as possible until there are no more cadre units ready or the AC

requirement has been met. If the requirement for AC forces has not been met after

deploying all ready cadre units, then the assignment algorithm looks to deploy fully rested

AC units. The algorithm starts looking for units at home the longest (*ACMaxH)* and

incrementally looks for AC units to deploy until it reaches the minimum number of periods

at home for the AC specified by the user. If after deploying all AC units at home more than

the minimum, the requirement for deployed AC forces is still not met, then the algorithm

will redeploy AC units already deployed. If the requirement for deployed AC forces is still

not met, the model will display the error message shown in Figure B.13, which displays the

period in which the algorithm was unable to meet the requirement for AC forces.

Figure B.13—Failed Force Assignment Message
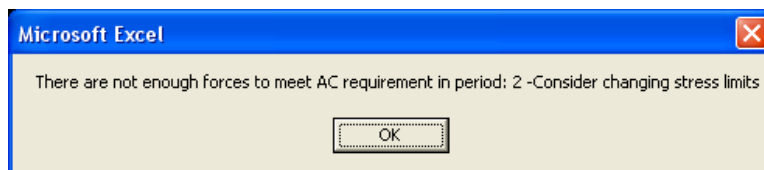
If the algorithm is able to meet the demand for AC forces in a given period, it will

move on to trying to meet the total requirement for deployed forces. Again, the algorithm

begins by deploying cadre and active units at home the longest. However, the algorithm

stops looking for AC units at home less than the threshold for RC deployments specified by

the user. When it reaches this threshold, the algorithm looks to see if there are any RC units

at home for the longest possible time (*RCMaxH*).[139] If there are fully rested RC units, the

model deploys as many units as needed. If the requirement for deployed forces is still not

met, the algorithm will return to deploying AC units at home for a period less than the RC

threshold, but more than the AC minimum. After deploying all AC units home more than

the minimum period of time, the algorithm will then redeploy AC units already deployed. If

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[139] The model is hard-coded so that RC units are always deployed with a full cycle of rest between
deployments. Unlike the AC, which we are willing to stress to some extent, we assume that RC units must have
a full five years at home between deployments. The user can change the dwell time for RC units to explore the
sensitivity of the results to this assumption.

the requirement is still not met, the model will return an error message similar to that shown in Figure B.13.

The assignment algorithm will repeat the process described above for each time period. Once the assignments are complete, all of the deployments determined by the algorithm are displayed in the force allocation datasheet as shown in Figure B.14.

Figure B.14—Flow Variables after Assignment

AC to be Redeployed			AC To Be Deployed											
1	2	3	1	2	3	4	5	6	7	8	9	10	11	12
						0	0	0	0	0	0	0	0	19
									0	0	0	0	0	19
									0	0	0	0	0	4
						0	0	2	0	0	0	0	0	0

RC to be Deployed																
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
																15
																13

B.1.4—Outputs

The LWAM produces two main outputs: stress on the AC and a time phased deployment graph. The force allocation datasheet automatically summarizes the stress on the AC by calculating the percentage of AC deployments from each number of periods at home. Figure B.15 shows the summary of AC stress produced by the LWAM.

Figure B.15—AC Stress Summary

AC Stress	8.1											
% Units	0.0%	0.0%	0.0%	5.6%	11.1%	9.9%	25.3%	17.9%	1.2%	3.1%	0.0%	25.9%
# Units	0	0	0	9	18	16	41	29	2	5	0	42
AC To Be Deployed												
3	1	2	3	4	5	6	7	8	9	10	11	12

The AC stress number in the top left of this spreadsheet calculates the average dwell time for AC units in trimesters. The # Units row counts the total number of units deployed from each time-step over the course of the war. The *% Units* row calculates the fraction of units deployed from each time-step as percentage of all AC deployments. These statistics are used in the body of the paper to compare stress on the AC for different force structures. The graph shown in Figure B.16 is automatically produced by the assignment algorithm. It summarizes the stress on the AC.

Figure B.16—AC Stress Graph
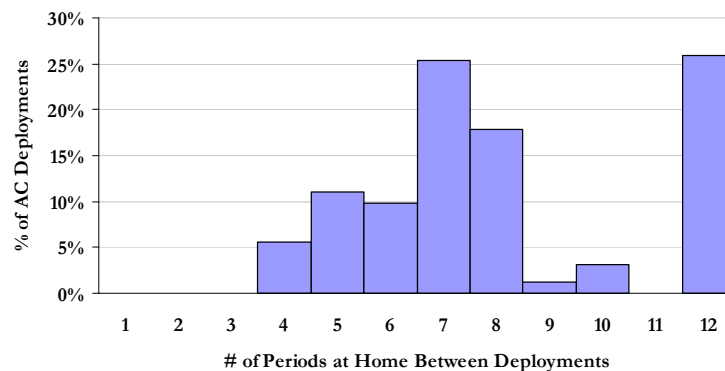
The second output that can be produced by the LWAM is the Time Phased Deployment (TPD) graph. This graph shows how the LWAM assigned forces to meet the requirement over a period of time specified by the user on the input screen. The TPD graph colors blocks of deployed forces differently depending on the type of force (AC/RC) and dwell time when deployed. This graph is intended to be consistent with the notional

deployment graphs contained in this paper. The user can create a TPD graph by clicking on the *5. TPD Graph* button on the input screen. Figure B.17 shows the TPD for the *+6 Cadre* force examined in Chapter Two.

Figure B.17—Time Phased Deployment Graph
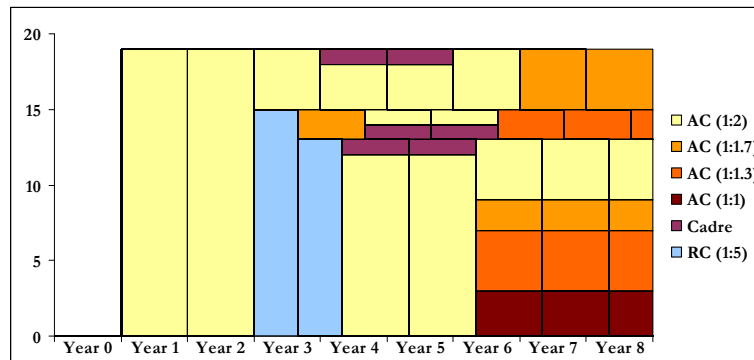
B.2—THE CADRE FORCE OPTIMIZER

The previous section showed how to use the LWAM to simulate the deployment of forces over time. The Cadre Force Optimizer is designed to use the results from the simulated deployments to find the smallest cadre augmented force possible under a given set of assumptions. The Cadre Force Optimizer requires all the same inputs discussed in the previous section. The key inputs to the Cadre Force Optimizer are the number of AC and cadre units in the force. The optimizer will take the number of AC and cadre units as given and find the smallest possible RC force that can meet the requirement for deployed forces in every period.

The Cadre Force Optimizer begins with the smallest possible RC force that can sustain rotation over the long term. For instance for a force with 35 AC BCTs and 16 cadre BCTs, the smallest number of RC BCTs that could help sustain a requirement of 19 BCTs is 19 BCTs. Therefore, the optimizer will start with a force with 35 AC, 19 RC, and 16 cadre

BCTs. The model will then simulate the deployment of this force using the algorithm

discussed in the previous section. If the simulation leads to an error message, this raises a

flag that alerts the cadre force optimizer to increase the size of the RC by one unit and

simulate the war again. This process is continued until a feasible force is found. Once this

force is found, the force allocation datasheet is displayed along with the outputs discussed in

the previous section. The cadre force optimizer was used in many of the analyses in this

paper to determine the smallest feasible cadre augmented force under different sets of

assumptions.

B.3—MODELLING ISSUES

There are a few modeling parameters that we hold constant in the LWAM that we

have not discussed. First, the LWAM assumes that AC, RC, and cadre units are of equal

effectiveness in wartime. We did not create parameters to vary the relative effectiveness of

forces because there is very little reliable data comparing the relative effectiveness of these

units. History also provides contradictory evidence about the effectiveness of cadre units.[140]

If cadre units were less effective than AC units, this would reduce the attractiveness of a

cadre augmented force. Second, we chose to model the force assignment process using

distinct thresholds, specifying that no unit can be deployed with less than some period of

time at home. In reality, these boundaries would be more fluid and the willingness to deploy

units might be based on a distribution rather than thresholds. We chose not to do this in our

analysis because there was no data to use to determine an acceptable distribution and the

threshold method is simpler to explain and model. The effect of using a distributional

method on the results in this paper would depend on how the assumptions about

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[140] For success stories see Brown (1986) and Dupuy (1987). For failures see Durr (1992).

distributions compared with the thresholds. The choice to model stress using a threshold model has one noteworthy effect. When using the cadre force optimizer to perform sensitivity analysis, slight increases in readiness/threshold parameters can lead to significant changes in cost. This occurs because when the cadre force optimizer finds an infeasible solution, it increases the number of RC units not only to make the force assignment feasible at the point of interest, but will also add RC units so that no AC units are stressed in earlier periods.

APPENDIX C—FURTHER SENSITIVITY ANALYSES AND MODEL VALIDATION

In the body of this paper, we explored the sensitivity of the cost savings from a cadre augmented army to nearly all of the assumptions we made. However, some assumptions were ignored for ease of presentation. This appendix further explores the sensitivity of the results presented in this paper to two more assumptions: (1) adding a peacetime deployment requirement and (2) static vs. stochastic force requirements.

C.1—ADDING A PEACETIME DEPLOYMENT REQUIREMENT

All of the analyses in the body of this paper assumed that all AC units are fully rested (two or more years at home) when a war begins. This is an unrealistic assumption if there is a requirement for forward deployed forces in peacetime. This section uses the Long War Assignment Model (LWAM) to explore the implications of this assumption for the relative attractiveness of a cadre augmented force.

A requirement for forward deployed forces can be met in two ways: using only AC forces or using AC and RC forces. This analysis will assume that forward presence requirements are met by using only AC forces. There are two reasons for making this assumption. First, there are a number of peacetime mobilization restrictions on the RC, which prevent them from being used for extended deployments without a declaration of war.[141] Second, Klerman's analysis of the cost-effectiveness of the RC implies that the more cycles in which we deploy the RC, the less cost-effective they are.[142]

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[141] Involuntary Call-up [10 USC 12301(b)] only allows the president to mobilize up to 200,000 reserves for up to 270 days.

[142] Klerman (2008)

We begin this analysis by making an assumption about the peacetime requirement for deployed forces and the distribution of AC forces when a war breaks out. First, we assume that nine deployed BCTs are required in every year during peacetime. Second, we assume that AC forces are uniformly distributed across states when a war breaks out. Table C.1 shows the distribution of AC forces at the time a war breaks out for a force with 42 AC BCTs and a peacetime requirement of nine BCTs.

Table C.1—Pre-War Distribution of AC Forces

	Deployed (months)			Home (months)										
State	0	4	8	0	4	8	12	16	20	24	28	32	36	40
AC BCTs	3	3	3	3	3	3	3	3	3	3	3	3	3	3

Assuming a uniform initial distribution of forces when a war occurs, we reproduced the analyses performed in Chapter Two.

C.1.1—Growing the Force with Cadre

When AC forces are uniformly distributed at the beginning of a war, there is no effect on AC stress for the forces that add AC units (+6, 9, 18 AC BCTs). There is only a change in AC stress for the cadre augmented forces. For a uniform distribution of forces, stress on the AC is decreased for the six and nine BCT expansions as shown in Figure C.1.

Figure C.1—AC Stress Comparison for Expansions by Initial Distribution of Forces
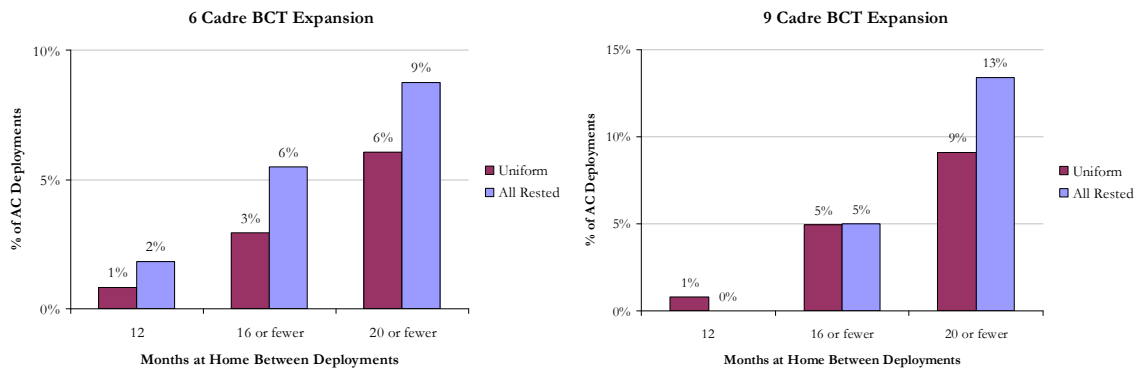
For the 18 cadre BCT expansion, the force is not capable of meeting the requirements without deploying AC units with less than one year at home when forces are distributed uniformly at the beginning of a war. Overall, we see that the initial distribution of forces affects the results in different ways. In the six and nine cadre BCT expansions, having the forces distributed uniformly at the beginning of the war reduces stress on the AC relative to having all units at home for more than two years. One possible reason for this is that having the forces uniformly distributed allows the assignment algorithm to smooth deployments rather than assigning large blocks of forces at once, which could lead to high stress on the AC. However, in the 18 BCT case, we find that having the force distributed uniformly at the beginning of the war prevents the assignment algorithm from reaching a feasible solution.

C.1.2—Changing the Mix of Force with Cadre

Changing to a uniform initial distribution of forces does not affect the stress on the AC for the *2011* force. Changing to a uniform initial distribution for the *CadreMix* causes the assignment algorithm to be infeasible. Although assuming a uniform distribution has no

effect on stress on the AC for the *2011* force, it prevents the *CadreMix* force from meeting

the same requirements without deploying an AC unit with less than one year at home.

C.2—MODEL VALIDATION

The analyses in this paper assume that all wars last ten years and occur once every

thirty years. These steady state assumptions allow us to perform tractable analyses. However,

in reality, some future wars will be short and some will be long. The Long War Assignment

Model (LWAM) is incapable of modeling this type of variation. The RAND SLAM program

is capable of modeling this type of variation.[143] This section compares the results derived in

Chapter Two with those calculated by the RAND SLAM program under the same

assumptions.

We replicated the analyses in Chapter Two with the RAND SLAM program under

the assumption that there is no peacetime demand for forces and that wars occur 33% of the

time and last, on average, ten years. Figure C.2 compares the average cost results from the

SLAM model with those calculated using LWAM for all of the forces we examined.[144]

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[143] Klerman et al (2008)

[144] Force costs are measured relative to the 2011 force. Normalizing costs in terms of the cost of the 2011 force allows us to compare the relative cost of these forces across models.

Figure C.2—LWAM vs. SLAM Cost Comparisons
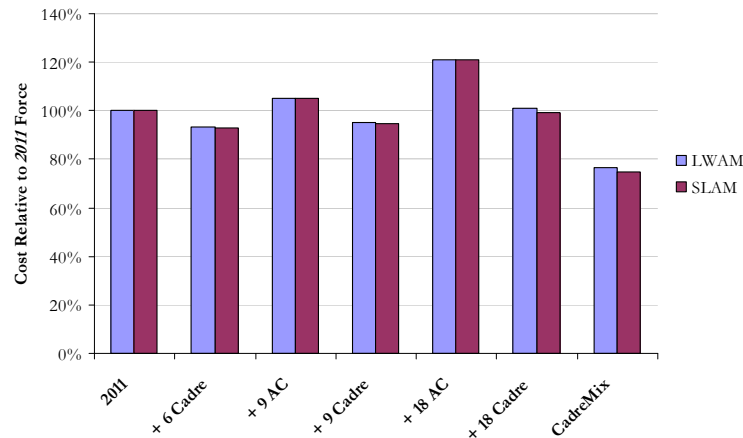
The average costs calculated by the RAND SLAM program are almost exactly equal to those calculated by the LWAM for all of the forces examined in this paper.

The RAND SLAM program can also calculate stress on the AC. Figure C.3 compares the percentage of AC deployments from 16 and 20 months at home calculated by the LWAM with those calculated by the RAND SLAM program.[145]

Figure C.3—LWAM vs. SLAM Stress Comparisons
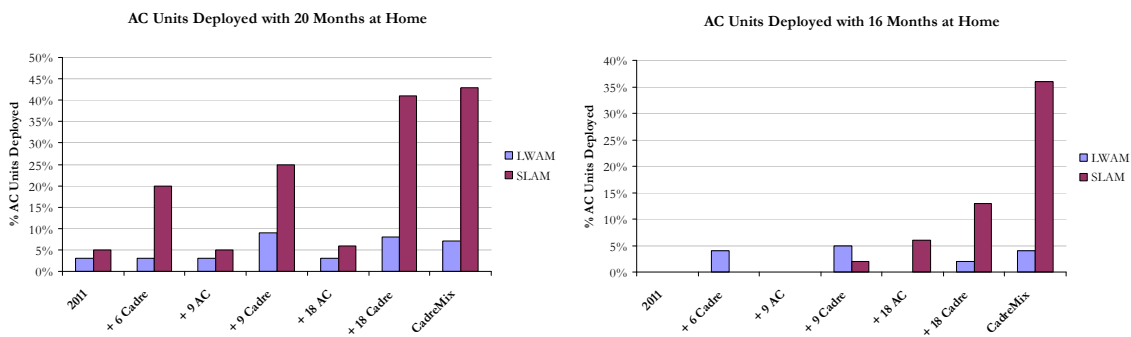
The number of units deployed with less than two years at home is much greater when calculated with the RAND SLAM program than with the LWAM. There are two

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[145] The qualitative results are similar for units deployed with 12 months at home.

possible reasons for this. The first reason is that two long wars can occur with very little time in between in the RAND SLAM program while all units are assumed to be fully rested at the beginning of a war in the LWAM model. Back-to-back wars would place a significant amount of stress on the AC because cadre units would need to be remobilized[146] and many RC units would also be inaccessible for deployment at the beginning of the second war. The second possible reason is that there are differences in the assignment algorithms between SLAM and the LWAM. Once a unit is deployed in the LWAM model, it is deployed for as long as the maximum deployment specified for that force. A unit deployed in the SLAM model can be deployed for any period of time depending on the number of look-ahead periods and the assignment rule.[147] In the LWAM, this means that once a unit is deployed at the beginning of a war, it is deployed for as long as possible after which a replacement unit is deployed. In the SLAM model, some of the units deployed at the beginning of a long war are only deployed for short tours because the SLAM model "thinks" that the war will not last very long. This leads to increased stress on the AC because those units deployed for short tours at the beginning of the war will be called upon for redeployment sooner than they would have been if they had been deployed for the maximum deployment length.

This section has compared the analyses performed in Chapter Two with the LWAM with similar analyses carried out with the RAND SLAM program. We find that the cost results are almost identical. However, we also find that the SLAM model calculates a much higher level of stress on the AC than the LWAM. This may be due to both the stochastic nature of the SLAM model and differences in the force assignment algorithms.

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[146] Once cadre units are demobilized in the SLAM model, they require the full 36 months to be remobilized. This is an unrealistic assumption, but is required for modeling purposes.
[147] See Appendix D of Klerman et al (2008) for a discussion of SLAM assignment rules.

Paper Two—An Operational Analysis of Cadre

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FIGURES

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1. INTRODUCTION

The first paper of this dissertation showed that a cadre augmented force can significantly reduce annual costs. Those analyses were based on a specific conceptualization of how a cadre unit would be structured, organized, activated, filled, trained, and demobilized. However, there are a number of different ways that we might conceptualize a cadre unit. From cadre unit design choices such as structure and organization to outside constraints such as activation, filling, and training, there are a myriad of issues that could lead a cadre unit to look very different from the one we analyzed in the first paper of this dissertation. This paper explores these design choice and constraints. The major issues regarding cadre units can be separated into peacetime and wartime issues. This chapter provides a brief overview of these issues.

We find that the two major concerns with cadre units in practice are activation and filling. In the first paper, we assume a 12 month deliberation delay for national leaders to decide whether or not to activate cadre units. A longer delay could mean that cadre units are activated too late to be of use. We find that filling is a concern for all of the cadre augmented forces analyzed in this dissertation because it is unlikely that recruiting alone could fill out even the smallest cadre force. We consider Individual Ready Reserve (IRR) activation and offering bonuses to RC personnel to serve in cadre units as ways to supplement recruiting increases. However, each of these alternatives has drawbacks that need to be carefully considered.

1.1—PEACETIME CONCERNS

There are three main concerns with cadre units in peacetime: structure, organization, and equipment. All three are design choices that can be made by the DoD. The DoD can choose how many and which personnel to retain in peacetime (structure), what duties should be assigned to these personnel (organization), and how much equipment to assign to cadre units (equipment). In this paper, we examine five alternative cadre structures: retaining all officers and NCOs, retaining senior officers and NCOs, relying on increased wartime promotion, relying on activation of IRR personnel, and a combination of increased promotion and IRR activation. We find that if cadre leaders are retained on active duty during peacetime that the relative cost of a cadre unit can be much higher than the 20 percent estimate we used in the first paper. In the worst case, a cadre unit retaining all officers and NCOs costs 56 percent of an AC unit during peacetime. In the best case, a cadre unit relying on increased wartime promotion and IRR activation costs 18 percent of an AC unit during peacetime. However, relying upon increased promotions and IRR activations involve significant risks. Overall, retaining cadre leaders in the AC can lead to costs much higher than the estimate used in the first paper.

The high cost of a cadre unit that retains all leaders in the AC during peacetime served as the impetus for us to consider a variety of cadre organizations. We find that alternatives such as assigning cadre leaders other duties or retaining cadre leaders in reserve status can significantly reduce the cost of a cadre unit during peacetime. Assigning cadre leaders other duties, such as training or education, reduces the cost of a cadre unit because some costs can be assigned to other accounts. Retaining cadre leaders in the reserves reduces the relative cost because reservists are paid only a fraction of the time. It is reasonable to

assume that cadre leaders could be assigned other duties or retained in the reserves given that they would have a significant amount of time (years) to hone their leadership skills before deploying. We assume that all cadre leaders retained in the AC would be rotated through cadre leadership positions as they are through staff and line positions but that cadre leaders in the reserves would remain assigned to cadre units for the duration of their service.

The final peacetime cadre unit concern is how much equipment to assign to cadre units. Cadre units could be assigned less equipment than AC units because they would have many years to acquire equipment before deploying. We explore the general tradeoffs between three options for equipping cadre units: full equipment sets, rotational equipment sets, and relying upon the industrial base. Due to a lack of data, we ignored equipment costs in the first paper. In this paper, we consider only the qualitative differences between different equipment alternatives. Full equipment sets have the highest cost of the three options examined. However, rotational equipment sets and relying upon the industrial base both increase the risk that a unit will not have the equipment they need when they are ready to deploy.

1.2—WARTIME CONCERNS

Cadre wartime issues can be split into five stages that are shown in Figure 1.1 along with the durations we assumed in our base case analysis in Paper I.

Figure 1.1—Cadre Wartime Stages
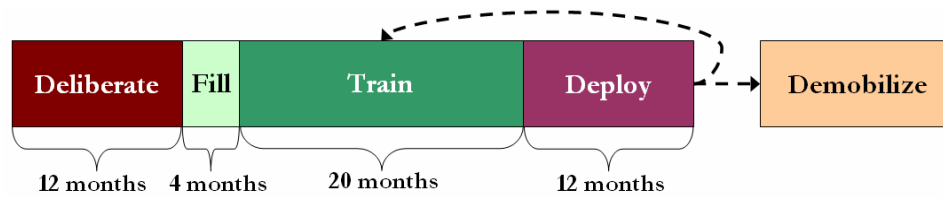
In this paper, we address all of these stages separately except deployment. Deployments for cadre units would be 12 months, the same length as AC deployments. Deliberation is an important concern because delays in activating cadre units can significantly reduce the attractiveness of a cadre augmented force. Activation of cadre units would require Congressional approval to increase end-strength. We explore the idea of pre-war cadre legislation allowing the DoD to increase end-strength for cadre without Congressional approval. However, we find that it is very unlikely that Congress would ever pass such a law because it would reduce its powers.

The most important concern regarding cadre units is the ability to fill units with junior personnel in wartime. We find that increased recruiting alone is unlikely to fill out a cadre augmented force at the rate assumed in the first paper. Therefore, we consider additional ways to procure junior personnel in wartime such as IRR activation and offering bonuses to RC personnel to join a cadre unit. Both of these alternatives create additional concerns. Filling units with junior personnel is the Achilles heal of a cadre force and needs to be carefully considered. However, for small cadre forces such as the *+6 Cadre* force, if we reduced the rate of cadre mobilization to one to two BCTs per year, a cadre augmented force would still reduces annual costs by billions of dollars and could likely be filled out solely by increasing recruiting.

In this paper, we also consider issues related to training capacity and demobilization of cadre units. These are of less concern than filling and activation issues. We find that there is enough excess capacity in the training system to train junior personnel for cadre units in wartime. We argue that while a cadre force cannot be demobilized all at once, it can be demobilized through decreased recruiting and increased separations over course of a few years.[1]

1.3—OUTLINE

This paper examines the issues discussed in this chapter in much more depth. Chapters Two through Four explore peacetime cadre concerns: structure, organization, and equipment. The fifth chapter discusses wartime issues: activation, filling, training, and demobilization. The final chapter summarizes the results and provides some concluding thoughts.

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[1] The amount of time to demobilize will depend on the size of the cadre force. Demobilizing 18 cadre BCTs will take much longer than demobilizing six cadre BCTs.

2.   PEACETIME CADRE UNIT STRUCTURE

The first paper in this dissertation assumed that a cadre unit would retain 25 percent of its personnel during peacetime. CBO (1992) estimated that this type of cadre unit would cost about twenty percent of an Active Component (AC) unit.[2] The DoD could decide to structure peacetime cadre units differently. This chapter explores various options for structuring cadre units during peacetime and calculates their respective costs.

Equally important to the peacetime cost of a cadre unit is the peacetime status of cadre leaders. The cost estimates in this chapter assume that all cadre leaders are retained[3] in the Active Component (AC) during peacetime, which leads to the highest possible cost estimates.[4] Cadre leaders retained in reserve status would be less expensive than those retained on active duty. The status of cadre leaders depends largely on the peacetime duties assigned to them. Some duties require that cadre leaders be on active duty while others would allow them to be retained in reserve status. Alternatives cadre duties are discussed in Chapter Three. Combinations of cadre structures and duties and their respective costs are summarized at the end of Chapter Three.

While this chapter considers only cost, the peacetime structure of a cadre unit will also affect readiness. It is likely that retaining more leaders during peacetime would increase the readiness of a cadre unit. Larger cadre units might mobilize faster for two reasons: (1)

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[2] This estimate was based on a the cadre force structure proposed in CBO (1992) which maintained separate stand-alone cadre units with peacetime manning levels 25 percent of AC units.

[3] In this paper, the term "retain" refers to the number of leaders assigned to cadre units on paper. It does not mean that these leaders are physically situated with a cadre unit with no other duties or that leaders are assigned to cadre units for their entire career. Chapter Three of this paper discusses alternative peacetime duties of cadre leaders. For all of the options that retain cadre leaders on active duty, we imagine a system that will rotate officers and NCOs through cadre assignments.

[4] In the first paper of this dissertation, we calculated that a cadre augmented force could still significantly reduce costs under this assumption for the peacetime cost of cadre.

shorter delays to recruit and/or activate leaders, and (2) more rapid training of junior personnel.[5] If we could estimate the relationship between cadre structure and readiness, we could calculate a direct tradeoff between cost savings from a cadre augmented force and stress on the AC.[6] However, it is difficult to estimate this relationship due to a lack of data. Additionally, the readiness of a cadre unit is determined by factors not related to the size of the cadre such as delays in activation. Therefore, we do not attempt to estimate the relationship between cadre unit structure and readiness.

Since cadre units have never been purposely maintained in the U.S. Army, there is little guidance to determine the appropriate size and structure of a cadre unit. Previous cadre proposals have provided some guidance, but there is no established standard. This chapter explores a variety of options for structuring cadre units in peacetime and calculates their costs.

In order to perform the analyses in this section, we extracted the grade structure of a BCT from U.S. Army Armor Center (2005) for each of the three types of BCTs (infantry, Stryker, and heavy).[7] The grade structures of these three types of BCTs differ only slightly so we chose to focus on infantry BCTs. Figure 2.1 shows the grade structure of an infantry BCT.

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[5] The justification for these is as follows: (1) cadre units that retain more leaders in peacetime need to recruit/activate fewer leaders in wartime and (2) additional leaders would reduce the ratio of junior personnel to leaders; this would reduce the amount of time it would take to develop proficient junior personnel.

[6] This would allow DoD decision makers to determine size of a cadre unit based how they value stress on the AC relative to cost savings.

[7] The full structure for all three types of BCTs is shown in Appendix A.

Figure 2.1—Infantry BCT Structure

	Rank	Personnel	Percent
OFFICERS	Lieutenant (O-1 and O-2)	129	3.7%
	Captain (O-3)	113	3.3%
	Major (O-4)	36	1.0%
	Lieutenant Colonel (O-5)	9	0.3%
	Colonel (O-6)	2	0.1%
	Chief Warrant Officer 1 & 2 (CW1, CW2)	23	0.7%
	Chief Warrant Officer 3 (CW3)	5	0.1%
	Chief Warrant Officer 4 (CW4)	2	0.1%
	Chief Warrant Officer 5 (CW5)	0	0.0%
ENLISTED	Private (E-1 through E-3)	858	24.7%
	Specialist / Corporal (E-4)	1124	32.4%
NCOs	Sergeant (E-5)	609	17.6%
	Staff Sergeant (E-6)	343	9.9%
	Sergeant First Class (E-7)	160	4.6%
	First / Master Sergeant (E-8)	44	1.3%
	(Command) Sergeant Major (E-9)	12	0.3%
SUMMARY	Total	3469	100.0%

57 percent of an infantry BCT is comprised of enlisted personnel in grades E-1 through E-4. In a cadre unit, personnel in these grades would not be retained in peacetime because they can be filled with new recruits in wartime. Enlisted personnel in these grades have, on average, two years of experience. Newly recruited enlisted personnel in cadre units would have about the same experience profile by the time a cadre unit is ready to deploy. Cadre units may or may not retain a full complement of officers and NCOs in other grades. The following sections explore variations in the number of officers and NCOs retained in cadre units and their relative costs.

2.1—RETAIN ALL OFFICERS AND NCOS

The structure of a cadre unit depends on which elements of a unit one thinks cannot be procured in wartime. The most pessimistic assumption would be to assume that you

could find no new officers or NCOs during wartime to assign to cadre units.[8] In terms of

grades, this would mean retaining all officers (O-1 and above) and NCOs (E-5 and above).

Figure 2.2 shows the structure of this type of cadre BCT.

Figure 2.2—All Officers and NCOs Cadre BCT

		AC BCT	% Retain	Cadre BCT
OFFICERS	Lieutenant (O-1 and O-2)	129	100%	129
	Captain (O-3)	113	100%	113
	Major (O-4)	36	100%	36
	Lieutenant Colonel (O-5)	9	100%	9
	Colonel (O-6)	2	100%	2
	Chief Warrant Officer 1 & 2 (CW1, CW2)	23	100%	23
	Chief Warrant Officer 3 (CW3)	5	100%	5
	Chief Warrant Officer 4 (CW4)	2	100%	2
	Chief Warrant Officer 5 (CW5)	0	100%	0
ENLISTED	Private (E-1 through E-3)	858	0%	0
	Specialist / Corporal (E-4)	1124	0%	0
NCOs	Sergeant (E-5)	609	100%	609
	Staff Sergeant (E-6)	343	100%	343
	Sergeant First Class (E-7)	160	100%	160
	First / Master Sergeant (E-8)	44	100%	44
	(Command) Sergeant Major (E-9)	12	100%	12
SUMMARY	Total	3469	43%	1487

A cadre BCT retaining all officers and NCOs during peacetime would have 1,487

personnel, which is about 43 percent of the wartime strength of the unit. If cadre leaders are

retained on active duty and all costs of retaining these leaders are assigned to the cadre unit

during peacetime, this type of unit would cost 56 percent of an AC unit during peacetime.[9]

This estimate is based on the assumption that the full cost of the peacetime cadre is assigned

to the cadre unit and that all cadre leaders would be retained on active duty during

peacetime. This would only be the case for some types of cadre units discussed in Chapter

Three. When cadre leaders are assigned other peacetime duties such as training, their entire

cost is not fully assigned to the cadre unit and their peacetime cost could be significantly

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[8] We begin with this pessimistic case to motivate the development of other alternatives. It is unlikely that all officers and NCOs would be retained because some officers could be recruited, activated from the IRR, or promoted more rapidly in wartime.
[9] Cost calculations are explained in Appendix B.

lower. When cadre leaders are retained in the reserve, their cost would also be significantly

lower. Nonetheless, Paper I shows that even at 56 percent, a cadre augmented force still

significantly reduces annual costs.

2.2—RETAIN ALL SENIOR OFFICERS AND NCOS

In a 1990 report, CBO envisioned that cadre divisions would retain "on active duty

about 3,000 *senior* non-commissioned officers (paygrades E-6 and above) and officers

(paygrades O-2 and above) for each division."[10] Figure 2.3 depicts a cadre BCT that retains

all senior officers and NCOs as defined by CBO.[11]

Figure 2.3—Senior Officers and NCOs Cadre BCT

		AC BCT	% Retain	Cadre BCT
OFFICERS	Lieutenant (O-1 and O-2)	129	50%	65
	Captain (O-3)	113	100%	113
	Major (O-4)	36	100%	36
	Lieutenant Colonel (O-5)	9	100%	9
	Colonel (O-6)	2	100%	2
	Chief Warrant Officer 1 & 2 (CW1, CW2)	23	100%	23
	Chief Warrant Officer 3 (CW3)	5	100%	5
	Chief Warrant Officer 4 (CW4)	2	100%	2
	Chief Warrant Officer 5 (CW5)	0	100%	0
ENLISTED	Private (E-1 through E-3)	858	0%	0
	Specialist / Corporal (E-4)	1124	0%	0
NCOs	Sergeant (E-5)	609	0%	0
	Staff Sergeant (E-6)	343	100%	343
	Sergeant First Class (E-7)	160	100%	160
	First / Master Sergeant (E-8)	44	100%	44
	(Command) Sergeant Major (E-9)	12	100%	12
SUMMARY	Total	3469	23%	814

A cadre BCT retaining all senior officers and NCOs during peacetime would have

814 personnel assigned during peacetime, which is about 23 percent of wartime strength. If

all the costs of retaining cadre leaders were assigned to the cadre unit during peacetime, this

type of unit would cost 37 percent of an AC unit during peacetime. This cost is significantly

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[10] CBO (1990), emphasis added. The 3,000 personnel proposed by CBO are not *all* senior officers and NCOs.
[11] The data from U.S. Army Armor Center (2005) does not distinguish between O-1 and O-2 so we assume that half of the officers in the O-1/O-2 category are O-1s and half are O-2s.

lower than that of retaining all officers and NCOs but still higher than that of a single reserve unit.[12] It is worth considering whether the cost of a cadre unit could be reduced even further. Next, we examine cadre unit configurations in which only a portion of officers and NCOs are retained in peacetime as proposed in CBO (1990).

2.3—INCREASE PROMOTION RATES

During the conflicts in Iraq and Afghanistan, the Army increased officer promotion rates to fill a shortfall in officers due to transformation initiatives and a force structure expansion.[13] This same action could be taken to fill some senior positions in cadre units during wartime. The downside to this action is that cadre leaders would likely be less experienced and less skilled than their contemporaries. In this section, we consider how many officers and NCOs would need to be retained in peacetime if we explicitly planned to increase promotion rates during wartime.

To calculate the effect of promotion rates on grade structure we built the Markov Promotion Model which is described in Appendix C. This model allows us to determine the increase in the number of officers and NCOs in each grade over a period of time for different promotion policies.

2.3.1—Officers

For officers, we decided to explore the impact of changing the promotion policy from a base case calculated from a historical average to a new wartime promotion policy

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[12] However, because we assume that cadre units would be rotated like active units (more intensively than RC units), cadre units are still more cost-effective than RC units at a cost of 37 percent of an AC unit.
[13] CRS (2006b)

similar to that in place as of 2005.[14] The 2005 promotion policy increased promotion rates at each level and decreased promotion intervals for captain (42 to 36 months) and major (11 to 10 years).[15] Table 2.1 shows the promotion rates and intervals by rank for the base and wartime officer promotion policies.

Table 2.1—Officer Promotion Rates and Intervals

Rank	Base		Wartime	
	Rate	*Interval*	*Rate*	*Interval*
Captain	97%	42 mo.	98%	36 mo.
Major	93%	132 mo.	98%	120 mo.
Lt. Colonel	80%	60 mo.	89%	60 mo.
Colonel	55%	60 mo.	60%	60 mo.

Based on these two promotion policies, we calculated the percentage of officers that would need to be retained in peacetime if we planned to fill the remaining slots with newly promoted personnel. We performed this analysis using the Markov Promotion Model described it Appendix C. We assume that promotion policies are changed immediately at the beginning of the war and that all officers must be assigned to units two years after activation. Table 2.2 shows the percentage of officers per BCT in each grade that would need to be maintained in each peacetime cadre unit[16] for each cadre force analyzed in this dissertation.[17]

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[14] The base promotion policy is calculated from the historical average from FY2000 through FY2005. The wartime promotion policy is derived from the promotion rates as of 2005, which increased, on average, five percent from the historical average. [CRS (2006b), p. 9]

[15] CRS (2006b), p. 10

[16] This calculation assumes that only a percentage of new officers in each grade are available for service in BCTs (the remaining would go to CS/CSS units or the institutional army). The percentage available for BCTs is calculated by dividing the number of officers in BCTs in the force planned 2009 (officers per grade in a BCT [U.S. Army Armor Center (2005)] times the number of planned BCTS [42]) by the total number of officers in each grade planned for 2009 [Department of the Army (2007a)]. See Appendix C for more detail.

[17] The number of *new* officers available per cadre BCT varies with the size of the cadre force. Smaller cadre forces will have a higher number of officers per BCT while larger cadre forces will have a smaller number of officers per BCT.

Table 2.2—Percentage of Officers Retained in Cadre Units Planning for Increased Wartime Promotions

	+6 BCTs	+9 BCTs	+18 BCTs	*CadreMix*
O-3	59 %	73 %	86 %	85 %
O-4	70 %	80 %	90 %	89 %
O-5	59 %	73 %	86 %	85 %
O-6	67 %	78 %	89 %	87 %

Increasing the promotion rates and decreasing promotion intervals for officers as the army has done in the early 21st century can reduce the number of officers that cadre units need to retain in peacetime. For the cadre augmented force with six BCTs, increasing promotions lowers the number of officers that need to be retained to 60-70 percent of a full-strength BCT. For the nine and 18 BCT and *CadreMix* forces, these numbers increase to 70-80, 80-90, and 80-90 percent respectively. For all of these cadre augmented forces, increased officer promotion rates leads to a decrease in the number of lieutenants because they are promoted more rapidly. To sustain the same number of lieutenants in the force, officer accessions would have to increase by about 900 per year. This is an unrealistic single year growth rate given that the largest year-to-year increase in officer accessions was 393 from 1999 to 2000.[18] However, the Army could either activate lieutenants from the IRR or reduce exit rates to fill the remaining slots.[19]

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[18] CRS (2006b), p. 4

[19] If we assume that 63 percent of IRR lieutenants would show up when called upon (the rate of all IRR personnel who reported when called in 2004 [Korb (2005)]), then there would be about 2,900 available lieutenants [DoD (2005)] to fill about 500 slots (900 minus increased accessions of 400, the largest year-to-year increase in the last decade), more than enough to make this feasible.

2.3.2—Enlisted Personnel

We performed the same analysis for enlisted personnel based on average promotion rates from 2000[20] and a wartime case where each promotion rate is increased by five percent in each grade (the average increase in promotion rates for officers).[21] The wartime enlisted promotion policy also shortens the promotion interval from E-5 to E-6 from 48 months to 42 months.[22] Table 2.3 shows the promotion rates and intervals by rank for the base and wartime promotion policies.

Table 2.3—Enlisted Promotion Rates and Intervals

Rank	Base		Wartime	
	Rate	*Interval*	*Rate*	*Interval*
E-4	77 %	24 mo.	81 %	24 mo.
E-5	67 %	12 mo.	70 %	12 mo.
E-6	41 %	48 mo.	43 %	42 mo.
E-7	42 %	24 mo.	44 %	24 mo.
E-8	37 %	24 mo.	39 %	24 mo.
E-9	13 %	24 mo.	14 %	24 mo.

Based on the change in promotion policies detailed above, Table 2.4 shows the percentage of enlisted personnel per BCT in each grade that would need to be retained in peacetime if the army relied upon the wartime promotion policy described above to fill senior enlisted openings during wartime.[23]

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[20] Derived from Shukiar et al (2000), p. 28.

[21] As far as we can tell from the data we have, promotion rates for enlisted personnel did not increase during the wars in Iraq in Afghanistan. Therefore, we created a wartime promotion rate increase that is similar to the increase that took place for officers.

[22] Enlisted promotion intervals were derived from Department of the Army (2007c), p. 23 (for E-5, E-6) and p. 91 (for E-7 through E-9). These are consistent with the intervals in Williamson (1999).

[23] Here, we assume that only *senior* NCOs (above E-5) are retained during peacetime as suggested in CBO (1990). If all NCOs are retained, the cost of cadre units that rely on increased promotion increases significantly because increasing promotion rates hollows out the lower ranks (through E-5) thereby requiring a significant number of E-5s to be retained in peacetime.

Table 2.4— Percentage of Enlisted Personnel Retained in Cadre Units Planning for Increased Wartime Promotions

	+6 BCTs	+9 BCTs	+18 BCTs	*CadreMix*
E-6	62 %	75 %	87 %	86 %
E-7	77 %	85 %	92 %	91 %
E-8	56 %	71 %	85 %	84 %
E-9	85 %	90 %	95 %	94 %

Increasing promotion rates and decreasing promotion intervals for enlisted personnel reduces the number of NCOs that would need to be retained in peacetime cadre units. Increased enlisted promotion rates in the first two years of a war will also decrease the number of privates in the force because they are promoted more rapidly. However, the cadre augmented forces discussed in this dissertation assume that enlisted recruiting will increase in the first years of a war, which will offset the decrease in the number of privates created by higher promotion rates. However, this increases the size of the wartime end-strength expansion required to fill-out cadre units because some junior personnel that would have gone to fill junior positions in cadre units are needed to replace junior personnel in the existing force who have been promoted. This adds to the risk of relying on increased promotions to create new leaders for cadre units.

2.3.3—Structure and Cost

We used the promotion results for officers and enlisted personnel discussed above to determine the peacetime structure and cost of a cadre BCT that relies on increased wartime promotions to fill some officer and NCO positions.[24] We assume that these units retain no

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[24] This analysis does not take into account the feasibility and cost of training the additional officers and NCOs who are promoted. Winkler et al (1999) find that only about 63 percent of the capacity of the NCO training system is used [Winkler et al (1999), p. 14]. Therefore, the cost of additional training using existing facilities will likely be much smaller than the personnel costs we are considering here. It is also likely that the army will shorten the length of these courses in wartime as it has for the wars in Iraq and Afghanistan [Bender (2007b)].

junior officers (O-1) or NCOs (E-5).[25] The number of officers and NCOs retained in all

other grades depends on the number of slots that can be filled through increased

promotions. The peacetime structure of a cadre unit relying on increased wartime promotion

also depends on the size of the cadre force because the larger the cadre force, the fewer the

number of officers available per BCT in wartime. Figure 2.4 shows the structure and relative

cost of cadre BCTs relying on increased promotion rates for each of the cadre augmented

forces we analyzed in Paper I of this dissertation.

Figure 2.4—Structure and Cost of Cadre BCTs Relying on Increased Promotions

	Pay Grade	AC BCT	+ 6 Cadre BCTs	+9 Cadre BCTs	+18 Cadre BCTs	*CadreMix* (16 Cad. BCTs)
OFFICERS	O-1 and O-2	129	0	0	0	0
	O-3	113	67	82	98	96
	O-4	36	25	29	32	32
	O-5	9	5	7	8	8
	O-6	2	1	2	2	2
	CW1 & CW2	23	23	23	23	23
	CW3	5	5	5	5	5
	CW4	2	2	2	2	2
	CW5	0	0	0	0	0
ENLISTED	E-1 through E-3	858	0	0	0	0
	E-4	1124	0	0	0	0
NCOs	E-5	0	0	0	0	0
	E-6	343	214	257	300	295
	E-7	160	123	135	148	146
	E-8	44	25	31	38	37
	E-9	12	10	11	11	11
SUMMARY	Total	2860	500	584	667	657
	Percentage	100%	17%	20%	23%	23%
	Relative Cost	**100%**	**22%**	**25%**	**29%**	**29%**

The peacetime cost of cadre BCTs that rely on increased promotion rates to fill

senior ranks in wartime is less than the cost of maintaining all officers and NCOs and

slightly less than that of retaining only senior officers and NCOs. The relative cost of a cadre

unit relying on wartime promotion for cadre expansions of six, nine, and 18 BCTs is 22, 25,

and 29 percent respectively. The relative cost of a cadre unit relying on wartime promotion

in the *CadreMix* force is 29 percent.

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[25] The definition of junior enlisted personnel used here is taken from CBO (1990).

2.4—ACTIVATE THE INDIVIDUAL READY RESERVE

Another way to reduce the number of officers and NCOs retained in cadre units during peacetime is to activate members of the IRR to fill senior positions.[26] To analyze the cost of cadre BCTs designed to be filled with IRR personnel in wartime, we calculated the percentage of officers and NCOs per BCT in each grade that could be activated in wartime to fill slots in cadre BCTs for each of the cadre expansions.[27] We assumed that sixty-three percent of IRR personnel in each grade would show up when called upon.[28] For each cadre force, we then calculated the relative peacetime cost of maintaining a cadre BCT when we explicitly plan to fill some senior leadership slots with IRR personnel. Figure 2.5 shows the structure and cost of cadre BCTs in each of the cadre augmented forces examined in this dissertation.

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[26] CBO (1990) outlined a cadre force in which they expected to fill out about 70 percent of the slots in a cadre division with IRR personnel. However, the army IRR was much larger in the early 1990s (nearly 400,000 personnel) than it is in the early 21st century (just over 100,000 personnel). [DoD (2005), p. 161]

[27] Distribution of Army IRR personnel by grade was extracted from DoD (2005). See Appendix C for more detail on calculations.

[28] Korb (2005) notes that 37 percent of IRR personnel called for service in Iraq and Afghanistan failed to respond. The 63 percent that did respond provide a pessimistic estimate for the number of soldiers available given that many of those that failed to respond initially would eventually respond making this number closer to the 70% enlisted and 90% officer rate used by the Army for mobilization planning purposes. [Howe (2005), p. 22]. However, it should be noted that the Army chooses who to activate and it will select those individuals who are more likely to respond. Therefore, if all IRR personnel were called, the response rate may be lower than that estimated in Korb (2005).

Figure 2.5—Structure and Cost of Cadre BCTs Relying on IRR Activation

	Pay Grade	AC BCT	+6 Cadre BCTs	+9 Cadre BCTs	+18 Cadre BCTs	*CadreMix* (16 Cad. BCTs)
OFFICERS	O-1 and O-2	129	0	37	83	77
	O-3	113	0	4	58	52
	O-4	36	0	11	24	22
	O-5	9	1	4	6	6
	O-6	2	1	1	2	2
	CW1 & CW2	23	20	21	22	22
	CW3	5	4	4	5	5
	CW4	2	1	1	2	2
	CW5	0	0	0	0	0
ENLISTED	E-1 through E-3	858	0	0	0	0
	E-4	1124	0	0	0	0
NCOs	E-5	609	0	0	0	0
	E-6	343	285	304	324	321
	E-7	160	149	152	156	156
	E-8	44	40	42	43	43
	E-9	12	10	11	11	11
SUMMARY	Total	3,469	511	593	735	718
	Percentage	100%	15%	17%	21%	21%
	Relative Cost	**100%**	**20%**	**24%**	**31%**	**30%**

The IRR can provide a significant number of officers and NCOs during wartime. Activating IRR personnel to fill cadre units in wartime can significantly reduce the peacetime cost of a cadre BCT. For the six, nine, and 18 BCT expansions, the relative cost of a cadre unit that relies on the activation of senior IRR personnel is 20, 24, and 31 percent respectively. The relative cost of a cadre unit relying on IRR activation in the *CadreMix* force is 30 percent. These are about the same as the relative cost of cadre units that rely on increased promotion rates. There is some question as to whether senior officers and NCOs in the IRR would be capable of command without additional training. However, officers and NCOs would have *at minimum* six months to train before their junior personnel were ready to join a cadre unit.[29] This should be sufficient time for them to hone their leadership skills.

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[29] Six months is the minimum amount of time to recruit and train junior personnel for a cadre unit that is mobilized with no lead time. Most officers and NCOs would have much more time (two years) to prepare. Ideally, activated IRR officers and NCOs would be assigned to the later deploying cadre units.

2.5—A COMBINATION

We might also consider a cadre structure that relies on both increased promotions and IRR activation. Figure 2.6 shows the peacetime structure and relative cost of cadre BCTs that rely on both increased promotions and IRR activation to fill senior positions in wartime.[30]

Figure 2.6— Structure and Cost of Cadre BCTs Relying on Increased Promotions and IRR Activation

	Pay Grade	AC BCT	+6 Cadre BCTs	+9 Cadre BCTs	+18 Cadre BCTs	*CadreMix* (16 Cad. BCTs)
OFFICERS	O-1 and O-2	129	0	37	83	77
	O-3	113	0	0	43	35
	O-4	36	0	4	20	18
	O-5	9	0	1	5	5
	O-6	2	0	1	1	1
	CW1 & CW2	23	20	21	22	22
	CW3	5	4	4	5	5
	CW4	2	1	1	2	2
	CW5	0	0	0	0	0
ENLISTED	E-1 through E-3	858	0	0	0	0
	E-4	1124	0	0	0	0
NCOs	E-5	609	0	0	0	0
	E-6	343	156	218	281	273
	E-7	160	111	128	144	141
	E-8	44	21	29	36	36
	E-9	12	8	10	11	11
SUMMARY	Total	3,469	321	454	652	625
	Percentage	100%	9%	13%	19%	18%
	Relative Cost	100%	13%	18%	27%	26%

Relying on both increased promotions and IRR activation significantly reduces the number of officers and NCOs that a cadre BCT needs to maintain in peacetime. This leads to significantly lower peacetime costs. For the cadre expansions of six, nine, 18 BCTs, the cost of a cadre BCT relative to an AC BCT drops to 13, 18, and 27 percent respectively. The relative cost of a cadre unit in the *CadreMix* force drops to 26 percent. This is the least expensive cadre structure of those examined in this chapter. However, relying on increased promotions and IRR activation comes with risk. First, there is no guarantee that all officer and NCO slots will be filled going into a war. Therefore, increasing promotion rates may be

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[30] The calculations to derive these results are presented in Appendix C.

necessary just to reach the previously planned structure and no additional officers may be available for cadre units. Second, IRR personnel may also need to be activated to cross-level under strength active and reserve units in the first years of a war. This will reduce the number of IRR personnel available for cadre units.

2.6—CADRE STRUCTURE SUMMARY

In this section, we have examined five different peacetime cadre unit structures and their relative costs. The first cadre structure retained all officers and NCOs and cost 56 percent of an AC unit during peacetime. The second structure retained only senior officers and NCOs (O-2 and E-6 and above), which brought the relative cost down to 37 percent of an AC unit. The final three options (relying on increased promotions, IRR activations, and a combination of these alternatives) decreased costs even further. Table 2.5 shows the structure and cost of each of the alternatives discussed in this chapter.

Table 2.5—Alternative Cadre Personnel Structures and Costs

Cadre Structure	Peacetime Personnel (%)	% Peacetime Cost of AC Unit
All Officers & NCOs	1,487 (43 %)	56 %
Senior Officers & NCOs	814 (23 %)	37 %
Increase Promotion (9 BCT)	713 (21 %)	31 %
Activate IRR (9 BCT)	593 (17 %)	24 %
Promotion and IRR (9 BCT)	454 (13 %)	18 %

All of the relative cadre cost estimates developed in this chapter have assumed that one hundred percent of the cost of the peacetime cadre leaders is assigned to the cadre unit and that cadre leaders are retained on active duty. If we were to assign other duties to cadre

leaders, what we call "dual-hatted" cadre leaders[31], or retain cadre leaders in reserve status,

the peacetime cost of a cadre unit could be much lower. The next chapter explores relative

advantages and disadvantages of different peacetime cadre organizations.

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[31] Dual-hatted cadre leaders are leaders who have responsibilities beyond simply maintaining a cadre unit's mobilization plans and equipment during peacetime.

3. PEACETIME CADRE ORGANIZATION

The previous chapter calculated the peacetime cost of cadre units assuming that all the costs of retaining cadre leaders accrued to the cadre unit and that cadre leaders would be retained on active duty during peacetime. These are worst-case assumptions for the peacetime cost of a cadre unit. Even so, we found that a cadre unit could cost as little as 13 percent of an AC unit during peacetime. However, the peacetime cost of a cadre unit could be reduced even further. Assigning other duties to cadre leaders during peacetime can reduce the fraction of the costs assigned to the cadre unit. Keeping cadre leaders in reserve status rather than on active duty during peacetime would also reduce the relative cost of a cadre unit. However, some alternatives that reduce the peacetime cost of a cadre unit can also increase the risk of relying on a cadre augmented force. In this chapter, we examine the pros and cons of alternative peacetime organizations for cadre units. Additionally, the final section of this chapter explores whether there might be enough officers/NCOs in the existing force structure to lead cadre units in wartime.

The peacetime organization of a cadre unit has two components: (1) the state of cadre leaders during peacetime (together in one unit, assigned to different units, etc.) and (2) the peacetime duties of the cadre leaders. We consider reserve status as a peacetime duty alternative, one in which the duties of the officer or NCO are to train periodically or simply to keep their contact information up to date.

This chapter separates the peacetime organization of cadre organizations into three categories: those maintaining separate cadre units, those maintaining the cadre within the

existing force structure, and those that rotate AC units through cadre status over time.[32]

Figure 3.1 depicts the three alternative cadre force organizations examined in this chapter.

Figure 3.1—Alternative Peacetime Cadre Organizations
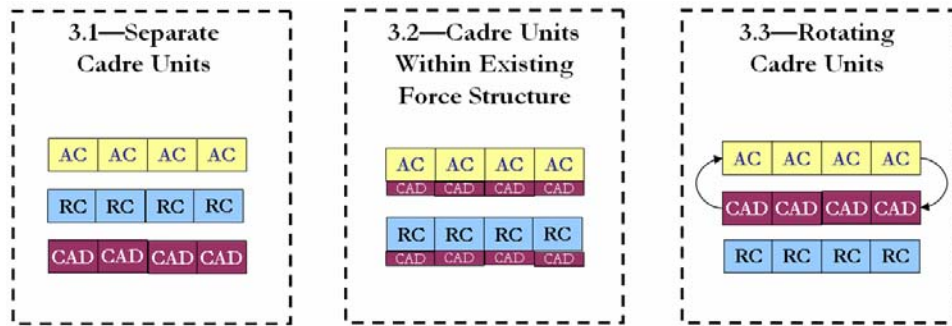
For all these organizations, we assume that active officers and NCOs would be

rotated through cadre leadership positions as they are through staff and line positions.[33] No

active cadre leader would be permanently assigned to a cadre unit but would instead serve a

pre-specified tour with a cadre unit. We do not assume that reserve cadre leaders will be

rotated through assignments.

3.1—SEPARATE CADRE UNITS

Historically, the most commonly proposed structure for a cadre force is to have

separate cadre units that exist in peacetime. This type of cadre force was proposed by

Calhoun (1820), Upton (1878), and CBO (1990).[34] These units had a specified Table of

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[32] Some of the peacetime cadre organizations examined in this section were first described by James L. Lacy, formerly of the RAND Corporation, in an unpublished report. I am grateful to him for his work in fleshing out some of these ideas. Novel alternatives introduced in this paper include rotating, foreign army training, and TTHS cadre units.

[33] However, the Army may resist this type of policy because they will want the best leaders assigned to the AC units that would be first to deploy.

[34] The proposals of Calhoun and Upton called for all-cadre forces where every unit in the army was maintained in cadre status in peacetime. The CBO (1990) proposal called for a cadre-augmented force similar to those analyzed in Paper I of this dissertation. See Paper III of this dissertation for more detail on the history of cadre proposals.

Organization but were undermanned in peacetime. A separate cadre unit would consist of officers and non-commissioned officers (NCOs) in peacetime that could be either in reserve status or on active duty. We examine both options in this section.

The major concern with separate cadre units is what the cadre leaders will do during peacetime. Cadre leaders assigned to an under-strength unit lack junior personnel to train with during peacetime. Cadre assignments would slow the leader development process and make cadre leadership positions unattractive. Retired General Hamilton Howze makes this point in a 1990 article: "there is no more stultifying, uninspiring, depressing, and seemingly useless activity than that of serving in an under-strength military unit."[35] Because of this concern, we explore two alternative duties for the leaders of separate cadre units other than simply maintaining the unit.

3.1.1—Maintenance Cadre Units

To motivate the development of alternative cadre organizations, we first consider the most unappealing organization- a cadre unit that has no other peacetime responsibilities except equipment maintenance and leadership training. We call these units maintenance cadre units because their main duty in peacetime is to maintain the unit and its capability to expand in wartime. In the Congressional Budget Office's 1990 cadre proposal, they envisioned that "training under this concept would involve individual leadership training, physical fitness, instructor training, and unit training in the form of command post exercises. The purpose of the training would be to ensure that the cadre is prepared to train individual reservists in the event of mobilization for war and knows how to conduct combat

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[35] Howze (1990)

operations."[36] In essence, the cadre prepares for its wartime duties as best as they can without having junior personnel to train. We begin by assuming that the cadre leaders in a maintenance unit would be in the AC and then discuss how and why we might consider retaining leaders in the RC.

The maintenance cadre unit has only two advantages when compared to the other cadre duties examined in this section. First, leaders are constantly training for their wartime mission, albeit without junior personnel. This allows them more time to hone both their mobilization plans and their leadership skills. Other cadre organizations discussed in this section assign other duties; this can distract leaders from core unit tasks. Second, leaders of maintenance cadre units will "know" the equipment that they will use in wartime. Most other cadre organizations we examine would assign contractors to perform maintenance; this reduces the familiarity that leaders would have with the equipment.

The maintenance cadre unit has two major disadvantages: high cost and reduced leader proficiency. As discussed in the previous chapter, if the cadre's only duties are to maintain the unit, *one hundred percent* of the peacetime cost of cadre leaders is assigned to the cadre unit. Other cadre organizations discussed in this chapter assign a fraction of these costs to other accounts. Proficiency is also a concern with maintenance cadre units because although they have more time to focus on training for their wartime mission than other cadre units, they still lack junior personnel to train. The "command post exercises" proposed by CBO only go so far in replicating a real life combat situation. In order to fully practice maneuvers, the cadre leaders need junior personnel to direct. Lacking these personnel, training exercises become more like "busywork" than a training experience. Other types of

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[36] CBO (1990), p. 16

cadre units discussed in this chapter provide cadre leaders with more realistic training experiences that could lead to increased proficiency. Leaders assigned to maintenance cadre units will be less experienced than they would be if another cadre organization was chosen. This means they will be less likely to be promoted which will also make cadre leadership positions more unattractive.[37]

Another concern is that cadre leaders from all types of cadre units would be less proficient than similar leaders assigned to active duty units. However, there is little concern about the wartime proficiency of these leaders because they would have *at least* six months to train with their unit's junior personnel before being deployed.[38] Nonetheless, the overall leader development process still remains a concern. Rotating active personnel through cadre positions will slow the leader development process throughout the army. This is a significant drawback of creating cadre units with active duty personnel.

The active army leader development problem could be alleviated by retaining cadre leaders in the RC rather than the AC. For this to work, these leaders would have to be prior-service personnel and the units would have to be based regionally.[39] Prior service RC leaders would have relevant leadership experience and would have enough time to practice their skills in wartime while junior personnel are recruited and trained. Additionally, a cadre unit with leaders in the RC would cost less than an AC cadre unit. The problems with

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[37] This has been true for assignments of AC personnel to RC units: "The Army typically does not reward the active officers it assigns to reserve component support duty, and typically does not assign its best officers to that duty. Not surprisingly, therefore, active officers seek to avoid service in reserve-support positions." [Jacobs (1994), p. 53]

[38] Officers maintained in cadre status during peacetime (not promoted or activated from the IRR) would have *two years* to hone their skills before being united with the junior personnel for their unit.

[39] This assumes that RC cadre leaders would train together in peacetime. Another possibility discussed in a later section is to retain cadre leaders in a "senior IRR."

maintaining a maintenance cadre unit in the RC are: (1) leadership skills may erode quickly[40] and (2) cadre units would compete with existing RC units for prior service leaders.

Overall, we have seen that the maintenance cadre unit is unattractive because it is expensive and reduces leader proficiency more than other cadre organizations. One way to increase proficiency and reduce the cost of cadre units is to assign them other duties during peacetime.[41] The next two sections explore the possibility of assigning other peacetime tasks to leaders of separate cadre units.

3.1.2—Domestic Training Cadre Units

In the previous subsection, we saw that the major problems with maintenance cadre units are high cost and low leader proficiency. One way to solve this problem is to assign the cadre unit another peacetime task besides maintaining equipment and training for mobilization. Cadre leaders could be "dual-hatted," responsible for both preparing their own unit for mobilization and performing some other duty for the Army.[42] One possible role for cadre leaders is training. We might consider using cadre leaders to perform either Basic Combat Training (BCT), or Advanced Individual Training (AIT). AIT is sometimes included in the same training course with BCT in a course called One-Station Unit Training (OSUT).[43] Cadre leaders could be responsible for BCT, AIT, or OSUT, depending on the needs of the Army. We call this second type of separate cadre organization a domestic

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[40] See Bodilly et al (1986) for a review of the literature on skill erosion.

[41] This assumes that other tasks would be more relevant to leader development than simply maintaining the unit and its mobilization plans.

[42] Dual-hatted cadre leaders would be on active duty since their tasks are well beyond what a reservist could reasonably perform when not mobilized.

[43] One Station Unit Training is common for combat arms military occupational specialties, especially Infantry.

training cadre unit.[44] This type of cadre unit was suggested by Jacobs (1994). Jacobs argues that Army Reserve training divisions could be easily transformed to cadre units.[45]

The major advantage of the domestic training cadre unit is that cadre leaders are assigned another task that is useful to the Army. Not only does the cadre not have to perform what they consider "busywork," but the Army also gets additional capability for the same cost during peacetime. Therefore, not all of the peacetime cost of the cadre leaders would be assigned to the cadre unit. Cadre leaders are also provided an opportunity to do what they expect to do: lead junior personnel in training exercises. Although these exercises are not the unit level exercises that an active duty officer would lead, they are better than having no junior personnel to train with as was the case with the maintenance cadre unit. This should reduce some of the proficiency concerns associated with maintenance cadre units.[46]

There are three major drawbacks to the use of domestic training cadre units. First, when domestic training cadre units are mobilized in wartime, someone must take over their training duties. It is possible that Army Reserve training brigades could serve this purpose but this would have to be carefully planned in advance. This is a major disadvantage of this type of cadre organization. Second, the training duties may distract cadre leaders from their

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[44] We use the word domestic to distinguish this type of cadre unit from the foreign training cadre units discussed in the next subsection.

[45] Jacobs (1994) suggests: "units that could perhaps be more readily converted to cadre status currently exist: the Army Reserve training divisions. A reorganization of the training divisions and a reorientation of their focus could accomplish the transition to cadre divisions easily. The present mission of these stateside units is to conduct initial entry training-to train soldiers as individual replacements for deployed or deploying units. In the event of a conflict requiring less than full or total mobilization, the cadre training divisions would retain their current mission of training individual replacements. For full or total mobilization, they would train soldiers as members of their own deployable units." [Jacobs (1994), p. 133]

[46] Jacobs writes that transforming Army Reserve training divisions to cadre divisions would also improve morale: "Converting training divisions into cadre units and retaining their current mission would forestall the fear that cadre divisions, as they are currently described, would suffer from the morale problems that accompany the idleness and lack of resources inherent in low-priority units." [Jacobs (1994), p. 133]

first priority of preparing their own unit for mobilization. They would not spend as much

time focusing on higher-level training exercises and would lack experience with their unit's

equipment, unless this equipment was also used for training. Third, U.S. Army Training and

Doctrine Command (TRADOC) currently provides the instructors to train new recruits.

Creating domestic training cadre units would require reorganizing the TRADOC individual

training system to allow cadre leaders to train new recruits.

3.1.3—Foreign Training Cadre Units

Another potential duty to assign to cadre leaders in peacetime is training of foreign

armies. Since the end of the Cold War, the United States has been expanding its role in

training and equipping foreign militaries.[47] Before 9/11, these programs were focused on

"improving human rights conditions in foreign military institutions, strengthening

democracy, and increasing U.S. military interaction with foreign governments."[48] Since 9/11,

the United States has broadened its focus to aid countries facing threats from terrorist

organizations.[49] This has increased the requirement for foreign military trainers. Historically,

these duties have been assigned to special operating forces (SOF). However, with the

increased requirement for trainers due to the Global War on Terror and the difficulty of

increasing the size of the SOF,[50] the need for regular army and reserve personnel to perform

these types of missions has increased. This is expressed in the Army's counterinsurgency

field manual: "The scope and scale of training programs today and the scale of programs

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[47] Lumpe (2002)

[48] Garcia (2002)

[49] These missions are generally referred to as "Foreign Internal Defense" (FID) [Nagl (2007), p. 3]

[50] In 2006, the GAO questioned the ability of DoD to increase the size of the Special Operations Forces: "Given the military services' inability to fill current and past positions in their special operations forces specialties, it may be increasingly difficult to meet DOD's plan to increase the number of special operations forces through fiscal year 2011." [GAO (2006b), p. 22]

likely to be required in the future has grown exponentially. While Foreign Internal Defense

(FID) has been traditionally the primary responsibility of special operating forces (SOF),

training foreign forces is now a core competency of regular and reserve units of all

Services."[51] To perform these duties, some analysts have proposed a permanent Advisor

Corps in the AC.[52] This task is also well suited to cadre leaders during peacetime.[53]

Like the domestic training cadre unit, the major advantage of the foreign training

cadre unit is that the cadre unit has a peacetime task that is useful to the army. This can both

lower the peacetime cost of each cadre unit and increase the proficiency of its leaders. The

cost would be lower only if the U.S. Army was planning to invest resources into foreign

army training, such as the permanent advisor corps. This type of unit would also increase the

proficiency of cadre leaders only if they would be teaching skills that they would use in

leading their own units and some of their time was spent directing junior personnel in unit

level exercises.

The disadvantages of foreign training cadre units are similar to those for the

domestic training cadre units. First, foreign army training cadre units would require that the

United States either reduce foreign army training or find new personnel to staff these units

when cadre units are mobilized in wartime. Priorities shift during wartime and the DoD

might be willing to forgo some foreign army training, but this needs to be carefully

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[51] Department of the Army (2006), p. 6-3.

[52] Nagl (2007); Korb and Bergmann (2007), p. 23. Hoehn and Ochmanek (2008) argued that "the Army should be directed to designate a substantial number of its brigade combat teams (perhaps one-third or more of the active duty force) as advisory assistance units." The Marine Corps and Air Force already have permanent adviser units. [Drohan and Nagl (2008)] As of early 2008, foreign army training has become a DoD priority. In April 2008, the Pentagon requested an increase in funding for foreign army training and equipment by 250 percent. [Shanker (2008)]

[53] Some cadre-like units have already been used for this purpose: "In 2006, the Army centralized training for transition teams at Fort Riley, Kansas- initially giving the training mission to two cadre heavy brigade combat teams." [Nagl (2007), p. 5]. It is unclear what is meant by "cadre" in referring to these two heavy BCTs.

considered. This is a major drawback to foreign army training cadre units. Second, foreign training duties distract cadre leaders from their responsibilities as leaders of the cadre unit. Third, creating foreign training cadre units would require reorganizing the foreign army training program.[54] Lastly, like all other cadre units, assignments to foreign training units may not be attractive to officers. A major concern of many officers deployed to Iraq and Afghanistan as part of advisory units is that these assignments will hurt their chances of promotion.[55] This is an issue for all cadre units, but specific experiences with advisory units in Iraq and Afghanistan have shown that the Army is slow to adapt its promotion policies to new career paths.

3.2—CADRE WITHIN EXISTING FORCE STRUCTURE

An alternative to maintaining separate cadre units is to maintain cadre unit leaders within the existing army organization. This type of cadre augmented force would maintain all the personnel needed to lead cadre units, but they would not be organized into separate units until a war occurred. In this type of force, cadre leaders could be maintained in a variety of different ways. This section explores four ways that we might maintain cadre leaders without maintaining separate cadre units in peacetime.

3.2.1—AC Units with Surplus Personnel (AC+)

The first way we might maintain cadre leaders in peacetime without creating separate units is to assign surplus leaders to existing AC units. The cadre leaders would serve alongside AC unit leaders and would have opportunities to train and lead the junior

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[54] However, these changes would be no more significant than the proposal in Nagl (2007).
[55] Tyson (2007)

personnel in the unit.[56] There are a number of advantages to this type of cadre unit. First, this type of unit alleviates, to some extent, the proficiency issues associated with maintenance cadre units since the cadre leaders would have greater opportunities to lead troops. Although there remain some issues of having redundant leadership positions, this option is better than isolated cadre units in which leaders have no chance to work with junior personnel. Second, this type of cadre force provides the army with greater personnel flexibility than any of the previous cadre structures. When requirements surge, army planners can decide how many cadre units they need and mobilize only those units by separating the associated cadre from their AC units. The leaders from non-mobilized cadre units would either remain attached to their AC units or be available to fill open slots in other AC or RC units.

This type of cadre unit has two disadvantages. First, dispersed assignments prevent cadre leaders from getting together to plan for the mobilization of their unit. However, it could be arranged so that these leaders would meet periodically to go through planning exercises to alleviate this problem.[57] Second, cadre leaders may fight with existing AC leaders for leadership assignments in the AC unit they are assigned to. This might distract both AC and cadre leaders from their duties. To avoid this problem, the Army may wish to create clear guidelines for the roles and responsibilities of primary active duty leaders and their cadre counterparts.

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[56] The Army would need to be clear about designating a primary (AC) and secondary leader (cadre). The primary leader would get the majority of the training opportunities, but some should be set aside for the secondary leader.

[57] They could also utilize inexpensive communications technologies to "meet" and perform their planning exercises without physically being in the same location.

3.2.2—RC Units with Surplus Personnel (RC+)

Another way to organize a peacetime cadre force without separate cadre units is to have cadre leaders assigned to RC units near their homes. Officers and NCOs leaving the AC could be offered the option of affiliating with a reserve unit near their home. They would join the unit with the understanding that they would be affiliated with that unit only for training purposes and that in wartime they would be expected to serve as a full-time leader in a cadre unit.[58]

This type of unit has many of the same advantages as the AC units with surplus personnel. It addresses the low proficiency issue to a lesser extent than AC units with surplus personnel because there are fewer training opportunities in the RC. However, it is still better than the maintenance cadre unit. This cadre force configuration has the additional benefit of not affecting active duty personnel assignments. Whereas additional AC personnel would need to be assigned to AC units to serve as cadre leaders, RC units with surplus personnel would recruit only those individuals separating from service to serve as the leaders of cadre units. These personnel would need to have had relevant leadership experience in the AC. Lastly, this type of cadre organization would cost less than AC units with surplus personnel.

There are three disadvantages to this type of cadre force. First, this alternative assumes that there are enough officers and NCOs leaving active duty to fill all of the additional positions in RC units with surplus personnel. This would depend on the demand (how many cadre units) and the supply (how many officers and NCOs are separating and their interest in alternate forms of service). Second, like AC units with surplus personnel,

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[58] This is similar to the filling option discussed in Chapter Five that offers bonuses to junior RC personnel to serve in cadre units. Both of these options require maintaining a RC larger than needed for RC units so that some RC personnel could be called upon to serve in cadre units during wartime without affecting RC deployments.

leaders of these units would have little time to plan together in peacetime and would likely

fight for training opportunities with RC leaders. Lastly, cadre units are expected to deploy

like AC units when mobilized. This would require that RC leaders that stay affiliated with

their unit during wartime deploy once every three years. This will disrupt their civilian

careers. The ability to retain these cadre leaders throughout the course of a war will be a

significant concern.

3.2.3—Senior Individual Ready Reserve

Another alternative for structuring a cadre force with no separate cadre units is to

create a senior Individual Ready Reserve. The existing IRR is a pool of deployable personnel

not assigned to units who do not train and are serving out the term of their Military Service

Obligation (MSO). Since an initial MSO generally specifies eight years of service, members

of the IRR tend to be enlisted personnel who separated from service after three or four

years.[59] This pool of manpower is a good source of junior personnel but not of officers.[60]

Instead, we might think of creating a senior IRR, which would offer officers and NCOs

separating from active duty compensation in exchange for agreeing to be mobilized with a

cadre unit in wartime. The cadre leaders could be offered: points towards retirement

benefits, health benefits, cash compensation, or some combination. No matter what the

incentive, these personnel would only be able to serve within a few years of separating from

active service due to skill erosion. Additional yearly training could also be included as a

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[59] Eighty percent of the IRR is enlisted personnel in grades E-1 through E-5. DoD (2005)

[60] Some IRR officers can be used to fill senior cadre positions as shown in Chapter Two, but the IRR cannot be relied upon as the sole source of leaders for cadre units.

condition of senior IRR membership. This would increase the cost of this type of cadre organization.[61]

The major advantage to this type of cadre force is that would likely cost less than all of the other cadre forces discussed in this section.[62] In addition, the senior IRR would not affect the leadership development process of the active army or create redundant positions in existing units.

The first major disadvantage of the senior IRR cadre force is that leaders are training minimally or not at all, which will reduce their proficiency. However, given that cadre leaders would have *two years* before they would be united with their junior personnel, this organization seems worthy of consideration. The second disadvantage is a concern regarding the type of service agreement signed by the officer or NCO. If they are in the senior IRR before the war, but their service agreement does not extend more than two years into the war, they are of little use. The contract mechanism for senior IRR personnel assigned to cadre units must be carefully considered.

3.2.4—TTHS Cadre Units

In a May 2007 Strategic Studies Institute Op-Ed article, Dr. Douglas Johnson argues that as the total force is being expanded "it may be more important than ever to make time and space to allow the Soldier-leaders in this force to study, think, and 'waste time' doing

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[61] For a discussion of issues related to IRR refresher training and cost see Bodilly et al (1986).

[62] This depends on the amount of compensation required to retain personnel in the senior IRR. As of late 2007, the Army was offering reenlistment bonuses of $3,000 for individuals who enlist in the IRR for six years (http://www.military.com/benefits/military-pay/reserve-and-guard-pay/individual-ready-reserve-reenlistment-bonus, accessed December 10, 2007). If we assume this rate of compensation and a worst-case number of officer and NCOs (all officer and NCO unit structure and 18 cadre BCT force) then the annual cost of these reenlistment bonuses would be about $20 million. This is small in comparison to the magnitude of the cost savings from a cadre augmented force.

both."[63] He argues that this should be done by increasing the size of the Trainees, Transients, Holdees, and Students (TTHS) account, which would provide increased educational opportunities for officers and NCOs. Explicitly increasing the number of officers and NCOs in school and attaching some of them to cadre units is another way of organizing a cadre force in peacetime.[64] Johnson even hints at this possibility: "an increased TTHS account will provide the Army the ability to achieve … potentially, an expansion base for any larger conflict that might come along."[65]

There are a number of advantages to this alternative. First, retaining additional officers and NCOs in educational programs could reduce the relative cost of cadre units if the Army valued the additional educational experiences of officers and NCOs. Second, this alternative would not negatively affect the leader development process since the duties assigned to cadre leaders in peacetime are part of the leader development process. In addition, like the senior IRR, this alternative would not put cadre leaders in a situation where they would have to compete for leadership opportunities.

There are two major disadvantages to this alternative. First, leaders would not be developing combat leadership skills during these assignments as they would if they were leading an active duty unit. However, the Army's commitment to rotating leaders through staff and line assignments shows that these are both important. Like all the other non-

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[63] Johnson (2007), p. 1.

[64] This would require that cadre officers and NCOs be pulled out of school in wartime. This has always been a contentious point in the Army as it is generally thought not to be good practice to disrupt the education of officers to meet wartime needs. However, in this case, this would be education above and beyond what is currently being provided and therefore could be delayed until the end of the war without significant consequences.

[65] Johnson (2007), p. 3.

separate cadre alternatives, this alternative also provides little opportunity for cadre leaders

to meet together to plan for the mobilization of their units.

3.3—ROTATING CADRE UNITS

The final approach to organizing a cadre force that we examine in this chapter

rotates AC units through cadre status over time. In 1990, Tillson et al proposed the Ready-

Standby Organization, a force structure in which some AC units would rotate through cadre

status over time.[66] The design of this force is worth considering for the cadre augmented

force proposed in this dissertation. This section begins by describing the Ready-Standby

Organization and then examines how that model might be applied to create a cadre

augmented force consistent with ARFORGEN.

3.3.1—The Ready-Standby Organization

In 1990, Tillson et al aimed to create a force structure that would keep the same

group of personnel together over many years at a low cost. Their solution was the Ready-

Standby Organization (RSO), a force structure model that rotates units through two phases

(Ready and Standby). Tillson et al described that "under RSO, combat units would move

through different readiness/training stages with different mixes of full-time personnel, part-

time personnel, and former-service personnel at each stage."[67]

In the *Ready* phase, a unit would be formed of a group of personnel that trained

together for three years. This is similar to ARFORGEN in which a group of personnel stays

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[66] Tillson et al (1990)

[67] Tillson et al (1990), p. I-8

together in a unit for a three-year cycle and are then reassigned. Units in the Ready phase

would be fully manned with full-time personnel for three years.[68]

In the *Standby* phase, a unit would be composed of a mix of full-time personnel and

prior-service personnel. Tillson et al describe two types of Standby units: Standby 1 and

Standby 2. Standby 1 units have just reached the end of the three-year *Ready* phase at which

time some personnel choose to end active service or retire and others choose to remain in

the army. Tillson et al state that "those that remained on active duty would become 'double-

hatted' and would be assigned to advanced training or to jobs in the non-combat

organizations (e.g. recruiting)."[69] Those who had chosen to leave active service or retire

would remain on-call for one year (the Standby 1 phase) to mobilize with the same unit they

served with over the past three years. Tillson et al argue: "because of the high levels of

cohesion and expertise created while it was in Ready status, the Standby unit ought to be

able to restore its combat effectiveness fairly quickly in an emergency."[70] After one year in

the Standby 1 phase, a unit would move on to the Standby 2 phase. During this phase, some

personnel would be assigned to AC units, while others would remain on-call to be mobilized

as part of the same unit, either in the IRR or on active service in a non-combat role. In the

event of mobilization, two Standby 2 units would be combined to form one deployable unit.

Figure 3.2 shows the cycle of a RSO unit through the Ready and Standby phases over an

eight-year period.

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[68] ARFORGEN does not maintain 100 percent manning of a unit for the three-year period, it builds gradually
to 100 percent over the course of the cycle. Nonetheless, the personnel assigned at the beginning of the cycle
stay together throughout.
[69] Tillson et al (1990), p. I-10. Some full time members of the Standby 1 unit might also be assigned to
equipment maintenance.
[70] Tillson et al (1990), p. I-10

Figure 3.2—Tillson et al Ready-Standby Organization[71]
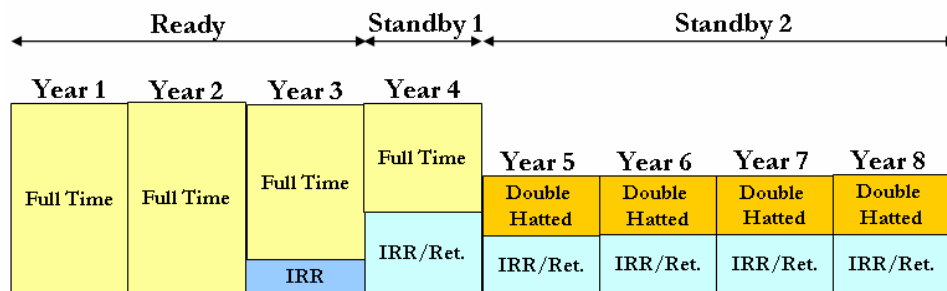
Tillson et al argued that the Ready-Standby Organization could both reduce costs and increase unit cohesion compared with the force structure that existed at the time. It is not important to go into further detail about the RSO except to say that the general principle of rotating units through cadre status over time may be another way to structure the cadre augmented forces proposed in this dissertation.

3.3.2—An ARFORGEN Rotational Cadre Force

We might think about applying the Ready-Standby Organization with to build a cadre augmented force. This would require significant changes to army personnel policies. However, these changes would be no more significant than some of the other options discussed in this chapter. Because the Army has recently adopted ARFORGEN, we consider reconciling RSO with ARFORGEN so that when a RSO unit is in active status it moves through the three ARFORGEN force pools. The rest of this subsection shows how we might apply the Ready-Standby Organization together with ARFORGEN.

We might consider a rotating cadre force where some AC units spend three years in active (ready) status building capability over this time according to ARFOGEN and three years in cadre (standby) status. To maintain the same capability, there would have to be two

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[71] Tillson et al (1990), p. I-9 [replicated]

rotating cadre units for every one cadre unit proposed in the first paper of this dissertation.[72]

The cost of this type of force would be equivalent to the cadre augmented forces examined

in this dissertation because the same number of units would be in cadre status at any given

time. Tillson et al estimate the cost of a Standby 1 unit to be five percent of a fully manned

unit.[73] The details of this cost estimate are not discussed in detail, but it appears that it is

lower than the estimates developed in this paper for two reasons. First, half of the personnel

in a Standby 1 unit are either in the IRR or retired and are assumed to cost nothing to the

army. Second, those individuals assigned to a Standby 1 unit that remain on active duty are

assigned other tasks (to which their costs are assigned);[74] this significantly lowers the cost of

the standby unit.[75]

Implementing this type of rotating cadre system would require significant changes to

army personnel policies. Individuals who join a unit during the active (ready) phase would be

required to be on-call in the three years following their service in this unit.[76] Additionally,

rotating cadre units would not be focused on their wartime mission in the Standby phase

because half the personnel would be assigned other duties while the other half will be in the

IRR. Rotating cadre units have the benefit of low-cost and increased unit cohesion, which

might help reduce some of the proficiency problems faced by other types of cadre units.

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[72] The rotating cadre unit would spend half of its time as an AC unit (ready) and half as a cadre unit (standby).

[73] Tillson et al (1990), p. VII-6

[74] Tillson et al (1990) does not provide specific examples of these "other tasks," but one might assume that they would include serving in staff or administrative positions.

[75] This is the same principle as the dual-hatted cadre idea proposed earlier in this chapter.

[76] This would likely require additional incentives for separating individuals or assignments that are not wartime critical for those who stay in the Army.

3.4—COMPARING PEACTIME ORGANIZATIONS

This chapter has explored a variety of different peacetime cadre organizations. In this section, we estimate the relative cost of a cadre unit in each peacetime cadre organization and provide a broad summary of the tradeoffs between the alternative organizations.

3.4.1—Cost Assigned to Cadre Units

In this chapter, we talked in relative terms about the effect of peacetime organizations on the peacetime cost of a cadre unit. In this section, we estimate the peacetime costs of combinations of different peacetime structures and organizations of cadre units. Table 3.1 shows our estimates for relative costs.

Table 3.1 —Costs of Different Cadre Structures and Organizations

Cadre Structure	Maintenance / AC+	Domestic / Foreign Training	RC+	Senior IRR
All Officers & NCOs	56 %	19 %	16 %	6 %
Senior Officers & NCOs	37 %	12 %	10 %	4 %
Increase Promotion (9 BCT)	31 %	10 %	9 %	3 %
Activate IRR (9 BCT)	24 %	8 %	7 %	2 %
Promotion and IRR (9 BCT)	18 %	6 %	5 %	2 %

We began by calculating the simplest relative costs- those cadre organizations that assign one-hundred percent of the cost of the cadre leaders to the cadre unit. Both the maintenance cadre units and the AC units with surplus personnel (AC+) fall into this category. The relative costs are the same as those calculated in Chapter Two. For domestic and foreign training cadre units, we assumed that one-third of the cadre leaders' time would

be spent on cadre unit duties.[77] For the RC unit with surplus personnel, we assumed that an RC cadre leader costs 28 percent of an AC cadre leader.[78] For the senior IRR, we assume that leaders are paid ten percent of AC pay in order to show up for one weekend every six months to verify their location and perform some planning exercises.

Two peacetime duties are omitted from Table 3.1 because the costs are difficult to calculate. First, we ignore the TTHS cadre unit because its cost would depend on how the Army valued additional educational opportunities. It is difficult to estimate how the Army would value this additional education. In the worst case that the army places no value on this, this type of cadre unit will cost as much as the maintenance and AC+ cadre units. Second, we ignore rotating cadre units because their cost would depend on the ratio of IRR personnel to dual-hatted personnel and the percentage of time that the dual-hatted personnel are performing cadre unit duties. Again, due to the uncertainties involved in estimating these, we do not try to estimate a relative cost.[79]

3.4.2—Tradeoffs

In this chapter, we have discussed a number of pros and cons for each of the peacetime cadre organizations we examined. In this subsection, we provide a broad picture of the tradeoffs between the alternatives explored in this chapter. Figure 3.3 shows a stoplight chart comparing the different alternatives on most of the criteria identified in this chapter.

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[77] We assumed that for domestic training cadre units one-third of each year would be spent on cadre duties. For foreign training cadre units, we assumed that half of years one and two of the peacetime ARFOGREN cycle would be spent on cadre duties and that the unit would be deployed in year three, performing no cadre duties in this year.

[78] Jaffe (2006)

[79] The five percent cost estimate from Tillson et al (1990) appears too low, but it is unlikely that the cost of this type of unit would exceed 20 percent of an AC unit.

Figure 3.3—Cadre Peacetime Duty Comparisons

	Proficiency	Cost	Risk	Leader Develop.	Mission Focus	Flexibility	Reorganization
Separate Cadre Units							
Maintenance	red	red	green	red	green	yellow	green
Domestic Training	yellow	green	red	yellow	green	yellow	red
Foreign Training	yellow	green	red	yellow	red	yellow	red
Cadre in Existing Structure							
Surplus AC	yellow	red	green	yellow	yellow	green	yellow
Surplus RC	yellow	green	green	green	green	green	green
Senior IRR	red	green	yellow	yellow	green	yellow	red
Increase TTHS Acccount	green	yellow	green	green	yellow	green	green
Rotating Cadre Units							
Ready-Standby Organization	green	yellow	yellow	green	yellow	red	red

Although the coloring on the chart shown above is approximated based on comments in this paper, it provides a visual summary of the pros and cons of each cadre organization described in this chapter. In terms of maintaining leader *proficiency*, the maintenance cadre unit and senior IRR is the worst. Cadre organizations that provide opportunities for leaders to hone their skills rank better in proficiency. The cadre organizations with the lowest *cost* are those that either retain cadre leadership in reserve status, or those with dual-hatted cadre leaders. *Risk* is only a concern for those cadre organizations that might require additional manpower to backfill their peacetime duties during wartime or which depend on IRR activation. *Leader development* is a concern for any cadre organization that maintains leaders on active duty and provides little opportunity to lead junior personnel in unit maneuvers. *Mission focus* is a concern for any cadre leaders that are dual-hatted and are not solely focused on their wartime tasks. The cadre force structures with the most *flexibility* are those that maintain cadre within the existing force structure. The separate cadre units are the second most flexible because they could be easily dismantled and redistributed. The rotational cadre force provides the least flexibility because the cadre units are intertwined with AC units. *Reorganization* is an issue for almost all the forces; they would all require significant changes to force structure and personnel policies, though some would require more significant changes than others.

Overall, there is no dominant peacetime cadre organization, but some have significant advantages over others. The maintenance cadre unit is the most expensive and provides few opportunities for leaders to train with junior personnel. We presented this as an option for two reasons. First, it is what has been suggested in the past and therefore served as a good starting point. Second, by pointing out its weaknesses, we motivated the development of the other alternatives discussed in this chapter. In exploring alternative organizations, we found that the cadre organizations that would lead to the greatest cost savings are RC units with surplus personnel or a senior IRR. Both of these options raise some concerns about the proficiency of the leaders. However, given that these individuals would be prior service personnel and would have two years to hone their skills before being assigned to their junior personnel, it seems reasonable to assume that these might be worth considering. Because these units do not use AC personnel to lead cadre units, they also do not affect the active army leader development process. Rotating cadre units might also be able to provide similar cost savings, but these would depend on the specific design of the rotational unit in cadre status (how many personnel dual-hatted/IRR/retired).

3.5—USE OF EXISTING LEADERS

One final alternative worth considering is that the army has enough leaders in its existing structure to lead new units in wartime. Table 3.2 shows the number of active duty officers and NCOs in each grade and the percentage of leaders not assigned to combat units that would be needed for three of the cadre forces examined in this dissertation.[80]

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[80] The number of officers/NCOs not assigned to combat units was calculated by subtracting the number of officers/NCOs needed to lead 48 AC BCTs from the number of personnel in each grade in 2008.

Table 3.2—Cadre Leaders Relative to Total Army

Grade	Active Army (2008)[81]	6 BCT	9 BCT	18 BCT
Officers				
Colonel (O-6)	3,332	0%	1%	1%
Lieutenant Colonel (O-5)	8,548	1%	1%	2%
Major (O-4)	16,072	2%	2%	5%
Captain (O-3)	25,328	3%	5%	10%
Lieutenant (O-1, O-2)	15,268	9%	13%	26%
NCOs				
Sergeant Major (E-9)	3,062	3%	4%	9%
First / Master Sergeant (E-8)	10,535	3%	5%	9%
Sergeant First Class (E-7)	35,861	3%	5%	10%
Staff Sergeant (E-6)	56,863	5%	8%	15%
Sergeant (E-5)	76,142	8%	12%	23%

At most, the largest cadre expansion requires 26 percent of the leaders not assigned to combat units in any grade. Although some of these officers are assigned to non-combat units, the number of leaders needed relative to the number not assigned to a unit is still high. However, to rely on the existing force structure to provide leaders for cadre units in wartime requires assuming that the duties performed by leaders not assigned to units could be ignored in the event of a war. If this were true, then cadre leaders would not need to be retained separately in peacetime and the peacetime cost of a cadre unit would be zero because 100 percent of their cost would be assigned to other duties. However, it is likely that the number of officers/NCOs not assigned to units would decrease if the number of active combat units were reduced. Therefore, reducing the number of AC units under the assumption that there would be enough leaders for cadre units within the existing force structure is not advisable. If some AC units are to be replaced with cadre units, careful consideration must to given to making sure there are a sufficient number of officers/NCOs not assigned to units retained during this process.

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[81] Department of the Army (2007a), p. 9 (estimate for September 30, 2008).

4.   EQUIPPING CADRE UNITS

Thus far, we have assumed that cadre units would be equipped similarly to AC units in peacetime by ignoring equipment costs. However, the extended time required to mobilize cadre units allows us to consider a number of alternative ways of reducing the equipment costs of cadre units below that of AC units during peacetime. This would make a cadre augmented force even more attractive than calculated in Paper I. While we do not integrate equipment costs into the analysis performed in Paper I, in this chapter, we consider how different equipping strategies might affect the cost and risk from a cadre augmented force.

There are two types of equipment costs: purchase costs and operation and maintenance costs. If cadre units are used to *expand* the force (*+6, +9, +18 BCT* forces), then reducing the amount of equipment assigned to cadre units below that of AC units would provide an initial one-time savings in purchase costs and additional yearly savings in operation and maintenance costs.[82] If cadre units are integrated by *changing the mix* of the current force (*CadreMix* force), then there would be no one-time savings in purchase cost for cadre units replacing AC units because full equipment sets already exist for these units.[83] Replacing RC units with cadre units could increase purchase costs if cadre units required more equipment in peacetime than RC units.[84] However, this is unlikely, because cadre units take longer to mobilize and would therefore have more time to acquire equipment before deploying. In both cases, cadre units would have lower operations and maintenance

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[82] Additional one-time savings in purchase costs would be achieved over the long-term when new equipment sets are needed to replace old ones.

[83] Though again, there would be savings over the long-term as equipment is replaced.

[84] RC units are generally not provided full equipment sets.

equipment costs than both AC and RC units because they would use the equipment much less intensively, if at all, during peacetime.

This chapter explores three options for equipping cadre units during peacetime: full equipment sets, rotational equipment sets, and relying on the industrial base in wartime.

4.1—FULL EQUIPMENT SETS

One way to equip cadre units in peacetime is to provide full equipment sets as we would for an AC unit. This arrangement was discussed in the cadre proposals of the Cold War drawdown when the reduction in the size of the force left surplus equipment.[85] This arrangement minimizes the risk of a unit not having the equipment when it is needed and provides each unit with a familiar set of equipment. However, it is also very expensive.[86] Of the three alternatives examined in this chapter, maintaining full equipment sets for each cadre unit is the most expensive. This cost will vary depending on how the equipment is maintained in peacetime. There are two ways we might think about maintaining a full cadre equipment set in peacetime: cadre maintained or contractor maintained in humidity controlled storage. Each of these options would have different costs and risks.

4.1.1—Cadre Maintained

The first way we might maintain a full set of cadre equipment in peacetime is to have the cadre leadership maintain it. This could only be accomplished by a cadre unit that would have enough time to perform maintenance. This eliminates all cadre organizations discussed in Chapter Three except the maintenance and domestic training cadre units. The

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[85] CBO (1990), CBO (1992)

[86] CBO estimates the cost of equipping one Stryker BCT at $1.6 billion. [CBO (2004), p. 34]

maintenance cadre organization specifically assigns the cadre leaders the task of maintaining their equipment during peacetime. The domestic training cadre unit could use their equipment for training exercises and oversee maintenance performed by the trainees.

The benefits of cadre maintained equipment are that the cadre leaders are familiar with their equipment and they can be sure it will be there when they need it. One downside is that assigning these duties can lower morale. This is relevant for maintenance cadre units in which officers and NCOs who have long graduated from performing equipment maintenance would be required to perform these tasks. It is less relevant for domestic training cadre units, which could use trainees to help perform some of the maintenance. While Chapter Three shows that the domestic training cadre unit would likely be cheaper than the maintenance cadre unit, if these units used their equipment in training exercises, then the additional wear and tear on the equipment would increase operation and maintenance costs. This would offset some of the cost savings from a cadre augmented force.

4.1.2—Contractor Maintained in Humidity Controlled Storage

Another option available for maintaining full cadre equipment sets in peacetime is to have the equipment maintained by contractors in humidity controlled storage. This was proposed in the Cold War drawdown as a way to maintain surplus equipment that would be mobilized in the event of a war.[87] This is also how some pre-positioned army equipment was stored before it was removed for the wars in Iraq and Afghanistan.[88]

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[87] DoD (1996)
[88] GAO (2006a)

This option would be required for cadre organizations that do not provide enough time for the cadre leaders to maintain their own equipment. This is true for foreign army training units that would be deployed periodically during peacetime as well as for all cadre organizations that do not maintain separate cadre units in peacetime.[89] In these cases, contractors would have to be paid to maintain the equipment during peacetime. This will add to the cost of a cadre unit in peacetime.[90] However, this also reduces the direct cost of a cadre unit since the cadre leaders are free to perform non-cadre duties. The decision between cadre and contractor maintained equipment must be based on a thorough cost-effectiveness analysis. Three key questions are:

- Is the *cost* of contractor maintenance lower than the cost of the cadre when they are assigned to equipment maintenance?

- Is the *quality* of the maintenance the same for contractor and cadre maintained equipment?

- How does performing maintenance affect the *morale* of the cadre?

There have been a number of studies concerning the outsourcing of defense services[91] but none have addressed the specific issue of unit equipment maintenance. This analysis is beyond the scope of this dissertation but is necessary in order to determine which alternative would minimize the cost of a cadre unit.

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[89] For the purposes of this discussion, this includes the rotating cadre units since most of their personnel either are in the IRR or assigned to other duties while units are in Standby (cadre) status. However, Tillson et al discuss the possibility of keeping some personnel assigned full-time to the unit for equipment maintenance while in Standby status.

[90] CBO (2004) estimates the cost of maintaining equipment for one BCT at a forward operating base in Eastern Europe to be $50 million per year. This is two orders of magnitude less than the cost savings from cadre forces.

[91] CBO (1995), Camm (1996), Ford (1998)

While this option would reduce the operation and maintenance cost of equipment because the equipment is never used, it will lead to additional costs for preparation, storage, and mobilization.[92] This alternative would also increase the amount of time needed to prepare equipment for deployment relative to the other alternatives since equipment would have to be removed from storage, tested, and repaired.

4.1.3—Costs and Risks

Assigning full equipment sets to cadre units has been the traditional method proposed to equip cadre units in peacetime. We have discussed two ways of doing this. Contractor maintained equipment in humidity controlled storage would have the higher operations and maintenance costs. However, this cost would be offset by the increased capability provided by the cadre in peacetime if they do not have to be concerned with equipment maintenance. Humidity controlled storage would require a longer lead-time to get equipment ready to deploy. But, there would be at least two years after activation for equipment to be prepared.

4.2—ROTATIONAL EQUIPMENT SETS

An alternative to providing each cadre unit with a full equipment set during peacetime is to take advantage of the nature of rotation to minimize the amount of equipment assigned to each unit. Fighting a war with rotation requires only that there be a full equipment set in theater for each unit deployed and enough equipment at home for units to train on.[93] In a rotational force, each unit does not need a full equipment set all the time.

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[92] For instance, repairs needed upon removal from storage.

[93] There would also be equipment waiting at repair depots that would need to be taken into account.

Instead, each unit could be provided only enough equipment to meet their training needs in peacetime. For AC units, this may not be an attractive option because it would not provide a fully equipped rapid response force. However, not all AC units in the force are needed at the highest level of readiness; these units could rely to some extent on rotational equipment sets. For RC units, this could also be an attractive strategy. However, the need to maintain equipment for use in homeland security and disaster relief missions could increase the levels of peacetime equipment beyond that which is just needed for training.[94] A rotational equipment strategy for RC units has been suggested in the past.[95]

A rotational equipping strategy is most attractive for cadre units. Cadre units do not need equipment in peacetime. Especially if the cadre leaders are dual-hatted, there is no need for each cadre unit to have a full equipment set in peacetime. Instead, cadre units could be provided only enough equipment to train on at the battalion level or below in the first years of mobilization. Then, before deploying, each cadre unit would rotate through one of the collective training centers where they would train at the brigade level on a set of equipment permanently assigned to each of the collective training centers. Cadre units would then "fall on" equipment left behind by AC or RC units already deployed.[96]

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[94] RC units maintaining equipment for homeland security/disaster relief missions would still require significantly less equipment than an AC unit.

[95] A rotational equipment strategy was suggested for Army National Guard Enhanced Separate Brigades (ESBs) that would be rotated for Smaller-scale Contingencies (SSCs). Quinlivan suggests: "Because these ESBs would never be used simultaneously, a single equipment set of medium weight vehicles could be kept at a centralized location that would be used by the units during their annual training. Only a few combat vehicles would be available to the ESBs in their home locations." [Williams (2001), p. 196]

[96] If we assume AC units deployed at the beginning of the war leave their equipment behind, this will reduce the amount of equipment available once they return home. However, under ARFORGEN, AC units will be in the Reset phase in their first year back from deployment and will not need equipment sets. At any given time, there will be at least 50 percent of AC equipment at home, which is enough to satisfy the needs of the rapid reaction force in the "Ready" phase (assuming equipment can be transferred from unit to unit if needed).

This rotational model has been the de facto equipping strategy used to fight the wars in Iraq and Afghanistan where most equipment is maintained in theater for units to "fall on."[97] Having units depend on theater-based equipment has also been proposed as part of a system that would rotate BCTs to forward deployed locations (Germany, South Korea, etc.).[98] This is less expensive than rotating in new equipment every time a new unit is deployed.

Having cadre units rely on rotational equipment sets would reduce the relative cost of a cadre unit if we were expanding the force because cadre units would not pay as much for the initial purchase of equipment and would have lower maintenance costs than AC units. Since cadre units would be the last to deploy, they could be assured that there will be enough equipment left overseas by AC and RC units. However, cadre units would need some equipment to train on in the early stages of a war. This could be as little as a single battalions worth of equipment on which cadre personnel could rotate through training opportunities. Each cadre unit would not need a full equipment set for collective training because the National Training Center (NTC) and Joint Readiness Training Center (JRTC) would be assigned full equipment sets under this plan.

If we assume that cadre BCTs are assigned one-third of a full equipment set in peacetime, then this would increase the relative cost of a cadre BCT in peacetime because

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[97] More formally, this equipment is called "Theater Property Equipment" and defined as "equipment procured for a previously deployed unit and passed on to an incoming unit as the first unit returns home. [Hsia (2008)]
[98] CBO (2004)

one-third is larger than the 20 percent relative cost assumed in the first paper. However, the

increase is likely to be small when equipment costs area amortized over many years.[99]

4.3—RELYING ON THE INDUSTRIAL BASE

"Mobilization in high gear should be held off until genuine evidence indicates that U.S.
military supremacy is starting to slip toward mere superiority. Deferring a surge in military
production and expansion until then would avoid sinking trillions of dollars into weaponry
that may be technologically obsolete before a threat actually materializes (The United States
waited too long – until 1940 – to mobilize against Nazi Germany and imperial Japan. But
starting to mobilize in 1930 would have been no wiser; a crash program in aircraft
production back then would have yielded thousands of ultimately useless biplanes.)"

-   Richard Betts[100]

A third way we might think about equipping cadre units in peacetime is to explicitly

plan to ramp up equipment production during wartime. This would not only reduce the

peacetime costs of cadre units by minimizing the equipment inventory, but it would also

ensure that cadre units are deployed with the most up-to-date equipment. However, there

are additional costs to maintaining an "expansible" industrial base. Care must be taken in

peacetime to preserve the ability to expand production during wartime.

Since the end of the Cold War, the size of the defense industrial base has been

shrinking as fewer new items are being procured. A cadre force that depends on increased

wartime production would require peacetime funding from the DoD to ensure that there is

excess capacity in production lines to produce key items. It is unlikely that a cadre unit

would depend entirely on increased production, but it may be able to reduce its inventory to

a level similar to that of a cadre unit depending on rotational equipment sets.

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[99] The cost of an equipment set for a Stryker BCT is about $1.6 billion [CBO (2004), p. 34]. If the cost of
equipment was amortized over ten years (a pessimistic estimate), then the relative peacetime cost of a cadre
BCT would only increase from 20 percent to 22 percent.
[100] Betts (2007)

Relying on the industrial base to produce new equipment during wartime increases risk by increasing the probability that a cadre unit will not have all its equipment when it is ready to deploy. This risk is described in Dewar et al (2000):

> "The current state of the industrial base for the five weapon systems can be described as 'warm'—that is, plants, tooling, and labor are currently being used to upgrade older models to newer models in all five cases. However, no units are being produced from scratch for the most part (other than a trickle of foreign military sales in some cases). Because the industrial base is not producing new units (it is not 'hot'), suppliers of key components are not always available ... This translates into a startup delay or lead time to produce new tanks."
>
> - Dewar et al (2000)[101]

This startup delay is a risk for cadre units in that they may not have the required equipment available when they are ready to deploy. Figure 4.1 shows the startup delay and maximum production rates for the "big five" equipment items for heavy divisions as of 2000.

Figure 4.1—Startup Delay for Producing "Big Five" Equipment Items[102]

Weapon System	Startup Delay or Lead Time to Produce New Units (years)	Production Rates per Year for 1/2.5 shifts	Maximum Production Rate (in HDEs/year)	Lead time to Build 2nd Plant (years)
Abrams tank	2	360/900	2.91	2
Bradley IFV	2	240/600	2.33	3
Apache helicopter	2.5	72/144	4.65	1
MLRS launcher	2	48/120	4.00	3
Patriot radar	2.5	12/24	6.32	3

In the worst case, after a startup delay of two years, the industrial base could produce almost three heavy division equivalents (HDEs) of Abrams tanks in the first year of

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[101] Dewar et al (2000), p. 59
[102] Dewar et al (2000), p. 61

production. This is equivalent to providing enough tanks for nine BCTs. However, these

tanks will not be ready until after cadre personnel are ready to deploy since we assumed in

the first paper of this dissertation that it would take two years to fill and train a cadre unit

after activation. Therefore, unless the startup delay could be shortened to less than two

years, the availability of equipment will constrain the deployment of a heavy cadre unit

relying on the industrial base.

The above analysis has focused on equipment for heavy divisions. Equipment for

light forces (infantry/Stryker BCTs) would not be as much of an issue. The startup times for

infantry equipment would likely be significantly shorter. Dewar et al (2000) omit equipment

from their model of light force expansion because they argue that "compared to outfitting a

heavy division, the light division equipment requirement is relatively modest."[103] They

explain that: "there are three main equipment items besides small arms that a light division

includes in its TOE (Table of Organization and Equipment): trucks, HMMWVs (High

Mobility Multipurpose Wheeled Vehicle), and artillery, either howitzers or MLRS (Multiple

Launch Rocket System)."[104] The authors looked briefly at the industrial base for trucks and

concluded that "the industrial base for trucks differs from the other five combat system

industrial bases in two important respects: it is "hot" and it is much more "commercial" in

nature."[105] Therefore, startup times for infantry equipment would likely be much shorter

than two years, enough time to provide equipment to deploying cadre units.

Overall, by relying on private industry, cadre units relying on the industrial base

could not be certain that they would have all the equipment they need when it is time to

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[103] Dewar et al (2000), p. 110
[104] Dewar et al (2000), p. 110, acronym descriptions added.
[105] Dewar et al (2000), p. 110

deploy. This is much more of an issue for heavy forces than for light forces. However, these units would get the additional benefit of receiving the newest equipment. This has the additional drawback that cadre leaders may not be familiar with the equipment.

4.4—COMPARING CADRE EQUIPPING STRATEGIES

This chapter has discussed three options for equipping cadre units during peacetime. Each of these has relative advantages and disadvantages. These are notionally summarized in the stoplight chart shown in Figure 4.2.

Figure 4.2—Comparing Cadre Equipping Strategies

	Cost	Risk	Readiness	Familiarity
Full Equipment Sets	🟥	🟩	🟩	🟩
Rotational Equipment Sets	🟩	🟨	🟩	🟨
Reliance on Industrial Base	🟩	🟥	🟨	🟥

Of the alternatives examined in this chapter, assigning full equipment sets is the most expensive. The lower cost of the other two options comes with an increase in risk and reduction in readiness and familiarity. It is most risky to depend on the industrial base to produce equipment because even in a rotational war, it is possible that the equipment will not be available. There is also some risk associated with rotational equipment sets because they do not provide a force capable of fighting larger wars *without* rotation. Reliance on the industrial base also reduces readiness because it takes time to ramp up production. Any delays in production could decrease the readiness of cadre units. Lastly, personnel in cadre units relying on rotational equipment sets may not be familiar with the equipment they are expected to use in theater because they trained on something different. This is also a concern of relying on the industrial base.

5. WARTIME CADRE UNITS

"We believe that availability for deployment (of cadre units) is dependent upon the time it takes to fill and train the unit and not the component (in which the cadre are retained)."
    - Army Secretary Michael Stone in Letter to House Armed Services Committee[106]

The first paper in this dissertation assumed that the first cadre unit will be ready to deploy thirty-six months after the beginning of a war. We also assumed that after the war is over, cadre units would be demobilized as quickly as possible. There are a number of steps required to mobilize and demobilize a cadre unit. We split the wartime state of a cadre unit into five stages: deliberation, filling, training, deployment, and demobilization. This chapter discusses concerns related to activating, filling, training, and demobilizing cadre units during wartime.[107]

5.1—ACTIVATION

Before a cadre unit is mobilized, it must be activated. Delays in activation can significantly reduce the attractiveness of a cadre augmented force. In the first paper of this dissertation, we showed that the longer the mobilization delay, the lower the cost savings from a cadre augmented force. Additionally, the need to activate cadre units early on, when the need for them is uncertain, creates an additional risk to the DoD that it may not have enough forces available when needed.

There are a number of ways in which cadre units could be activated depending on the way in which cadre units are authorized in law. In this section, we consider two

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[106] Tice (1991a)

[107] The deployment stage is no different for a cadre unit than any other unit and is therefore not addressed in this chapter.

alternatives: (1) activation requiring legislative and executive approval and (2) activation

without requiring legislative approval. We also consider how we might avoid delays in the

activation process through peacetime policy statements.

5.1.1—Activation Requiring Executive and Legislative Approval

In order to activate cadre units, recruiting will need to be increased. This requires

that the President requests, and the U.S. Congress provides, additional funding.[108] Therefore,

without any pre-war cadre legislation, actions must be taken by the President and Congress

to activate cadre units.[109] This could delay the activation of cadre units. The increases in

recruiting for some of the cadre augmented forces would be significant and would likely be

debated extensively by those in the executive branch and by members of Congress. If both

branches cannot agree to take action, cadre units that rely on end-strength increases could

not be activated.[110] This is a risk of relying upon a cadre augmented force.

5.1.2—Activation without Requiring Legislative Approval

One way to remove one of the barriers to cadre activation is to remove the need for

legislative approval of end-strength increases for cadre units. To do this, Congress could

pass a law during peacetime that allows for temporary increases in army end-strength

whenever the President requests them for cadre units. However, it is doubtful that Congress

would approve of passing such a measure because it reduces its power. Such a measure

would force Congress to give up its prerogative to declare war and its ability to control the

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[108] As dictated in the U.S. Constitution: "The Congress shall have the power to … raise and support Armies." (Article 1, Section 8)

[109] Unless funding is requested after the fact as has been the case with the supplemental funding bills for the Global War on Terror which have been used to pay for activated reservists.

[110] This would not be the case if cadre units were filled out entirely with personnel from the IRR. However, as shown in the following section, the IRR alone cannot fill out all cadre forces for a sustained period of time.

size of the military. Additionally, the President already has the power to mobilize the RC for a limited amount of time without Congressional approval. Therefore, it is unlikely that Congress will cede further authority. If this option is considered, the law should be written so that end-strength can only be increased upon the president's declaration of war and that end-strength increases are limited to that required by cadre units. Nonetheless, it still seems very unlikely that Congress would ever agree on such a law.

5.1.3—Delays in Activation

There is a concern with activating cadre units that is common to both of the alternatives we just discussed. Given the long lead time required to prepare cadre units for deployment and the inherent uncertainty in force requirements, it may take some time before a decision is made to activate cadre units. This delays the availability of cadre units. In the first paper of this dissertation, we assumed that cadre units would not be activated until after the first year of the war, but it may take longer than this. For this reason, it is advisable to set a policy in peacetime dictating when cadre units should be mobilized. For example, the policy might say that cadre units should be mobilized whenever the requirement for deployed forces surges for one year or longer to a level beyond that which the AC force can handle over the long term when used according to rotation guidance.[111] Making this policy guidance clear in peacetime might make it more likely that cadre units will be mobilized in a timely manner in wartime. However, nothing can guarantee that there will not be a delay in cadre mobilization. This is one of the major risks of relying on a cadre augmented force. The other major risk, the ability to fill out cadre units in wartime, is the topic of the next section.

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[111] This is simply policy guidance. Wartime decisions would be made based on force projections. The activation decision should err on the side of caution by activating cadre whenever there is a credible need for them.

5.2—FILLING OUT CADRE UNITS

Once a cadre unit has been activated, the first step in the mobilization phase is filling out cadre units with junior personnel. Previous cadre proposals have either ignored this issue or assumed that volunteering, conscription, or a federal reserve would be used to fill units during wartime.[112] The cadre force proposed in this paper deviates from these previous proposals in that there is enough time to increase end-strength. Since cadre units would not be needed at full-strength until many years after the beginning of a war, it is reasonable to assume that the size of the Active Component (AC) could be increased over the course of several years to fill out cadre units. However, we find that it is unlikely that end-strength increases alone could fill out the cadre forces analyzed in the first paper. Therefore, we consider other alternatives for procuring junior personnel: activating personnel from the IRR and offering bonuses to RC personnel to serve in cadre units.

5.2.1—Requirements

The number of junior personnel needed to fill out a cadre augmented force in wartime is determined by the size of the cadre leadership and the rate at which cadre units are ready for deployment. For the analyses in this section, we assume that 43 percent of a cadre unit's wartime personnel are retained in peacetime.[113] Therefore, each cadre BCT slice requiring 10,833 personnel would need 6,175 junior personnel in wartime. The number of personnel per BCT is calculated by dividing the size of the 2007 end-strength increase

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[112] The proposals of Calhoun and Upton discussed in the third paper of this dissertation completely ignored this issue. Other cadre proposals favored a federal reserve filled with citizens subject to universal military training. Cadre proposals of the 1990s assumed that the Individual Ready Reserve would be used to fill out cadre units. See Paper III of this dissertation for more detail.

[113] This is the percentage of personnel retained in a cadre unit that retains all officers and NCOs during peacetime (see Chapter Two).

(65,000) by the number of BCTs (six). This assumes that combat support (CS) and combat service support (CSS) units are also maintained in cadre status and have grade structures similar to a BCT. At a rate of three BCTs per year, an additional 18,525 junior personnel would be needed each year. Table 5.1 shows the annual increase in the number of junior personnel for different cadre unit structures and rates of mobilization.[114]

Table 5.1—Wartime Personnel Needed to Fill Out Cadre Units for Differing Cadre Unit Structures and Mobilization Rates

Cadre Mobilization Rate	All Officers and NCOs	Senior Officers and NCOs
1 BCT / year	6,175	8,342
3 BCT / year	18,525	25,025
6 BCT / year	37,050	50,050

5.2.2—Increasing End Strength

Since cadre units would have many years to prepare for deployment, it might be possible to fill out cadre units by increasing the end-strength of the AC. Increasing end-strength in wartime is not new to the United States Army. The Army has increased in size for almost every major war including the wars in Iraq and Afghanistan. In 2007, the army announced it was increasing its end strength by 65,000 personnel. There are two concerns with increasing end-strength in wartime: feasibility and cost.

As of early 2008, the Army planned to add six BCTs over the course of four years. This expansion occurred at a rate of about 9,000 new soldiers per year.[115] The cadre

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[114] Here, we consider only two of the five cadre unit structures examined in Chapter Two. We only need to consider these two structures because the number of junior enlisted personnel required is only determined by the cutoff for senior enlisted personnel. All of the cadre unit structures we examined in Chapter Two define senior enlisted personnel as either E-5 or E-6 and above. The fact that some structures do not retain all senior personnel does not affect the need for junior personnel because senior personnel will be procured by either increasing promotion rates or activating senior IRR personnel.

[115] Originally the expansion was planned to take five years at a rate of 7,000 additional soldiers per year [DSB (2007), p. 26; Korb and Bergmann (2007), p. 22]. In late 2007, the DoD stated that the expansion could be accomplished over four years [Cloud (2007)], this increases the rate of expansion to 9,000 per year.

expansion rate we assumed in Paper I of three BCTs per year would require an expansion

rate nearly twice this rate. Additionally, higher recruiting goals would need to be permanent

for the duration of a war, as personnel will leave the force and need to be replaced. As of

early 2008, the Army has been successful in achieving its higher recruiting targets.[116]

However, the Army has had to reduce its quality standards and significantly increase

recruiting expenditures to achieve these targets.[117]

Quality and cost will also be recruiting issues facing a cadre augmented force. Quality

will be a concern because research shows that a reduction in quality of personnel is

associated with a decrease in combat skills.[118] If cadre units are not as effective in wartime as

AC or RC units, they may not be able to replace them at the same tradeoff ratios assumed in

the first paper of this dissertation. This would reduce the cost savings from a cadre

augmented force. Cost will be a concern because increasing the number of recruits requires

increasing the size of recruiting bonuses, the number of recruiters, and advertising

expenditures.[119] If we assume that the supply curve for military personnel is linear then the

cost of a cadre augmented force would be the same as that of the equivalent non-cadre force

always maintained at wartime size. This would not be true if the supply curve is concave, in

which case the cost of increasing and decreasing the size of the force would be larger than

that of permanently maintaining the force at the higher wartime level. One last recruiting

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[116] DoD (2007d)

[117] CBO (2006), p. 6. Spending on enlistment bonuses increased 75 percent from 2000-2005 while spending on recruiters and advertising increased 38 percent and 73 percent over the same time period. [CBO (2006), p. 8-9]. Not all of these increases can be attributed directly to increasing end-strength. Fighting an unpopular war, together with a healthy economy and a declining percentage of the population qualifying for military service, has also spurred the Army to spend more on recruiting.

[118] Studies show that recruits who are better educated and have higher scores on aptitude tests are more likely to complete initial training, more likely to stay in the Army, and perform better in the military. [CBO (2006), p. 6]

[119] These are listed as the three "most important resources available to the army to influence accession levels" in CBO (2006). [CBO (2006), p. 7]

concern is that increasing recruiting now may make it harder to recruit in the future as you

enlist the potential recruits of tomorrow, today.

In order for a cadre augmented force to be attractive, one must believe that the

Army could achieve twice the 2008 expansion rate in wartime. One might think this could be

achievable in future wars if national support is stronger than for wars in Iraq and

Afghanistan, if expansion was started earlier in the war, or if the unemployment rate was

higher. Even under these favorable conditions, it seems unrealistic to assume that increased

recruiting alone could fill out cadre units at a rate of three BCTs per year.[120] Therefore, we

considered other sources of wartime manpower such as the IRR and maintaining a larger

RC.[121]

5.2.3—Activating the Individual Ready Reserve

The IRR is another source of manpower that could be used to fill out cadre units. In

a 1990 report, the Congressional Budget Office proposed that cadre units be filled out

entirely by members of the IRR.[122] At that time, the IRR was much larger than it is in 2007

because the AC was larger and therefore more people were transitioning from active duty

with outstanding military obligations.[123] However, the IRR remains large enough that some

junior personnel could be activated to help fill out cadre units. Under the same assumptions

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[120] However, Donnelly and Kagan (2008b) propose a ten-year expansion of ground forces at *30,000* personnel per year. They argue that "a commitment to expansion, with the concomitant understanding that a larger force is likely to be a less frequently deployed force , might well contribute to eased recruiting, as, even more, might a call for service on the part of American political leaders of both parties." [Donnelly and Kagan (2008b), p. 111]
[121] While increased recruiting may not be able to fill out a cadre force at a rate of three BCTs per year, it appears as though it could achieve a rate of one BCT per year (about the size of the 2007 expansion). At a rate of one BCT per year, only the six and nine BCT expansions would activate all cadre units over the course of a ten-year war. These forces would still reduce average long-run costs by about $4 billion annually.
[122] CBO (1990)
[123] In 1990, there were about 700,000 AC personnel in the army compared to about 500,000 as of 2007. [O'Hanlon (2004)]

about the IRR made in Chapter Two of this paper, there would be 44,000 personnel in grades E-1 through E-4 available for activation in the IRR.[124] This could provide enough individuals to fill out six cadre BCTs in the first two years of cadre mobilization. This is enough to fill out the entire *+6 Cadre* force without increasing end-strength.[125] However, this would deplete the stock of IRR members and there would be many fewer junior personnel available in the following years. Additionally, IRR personnel are individuals who have signaled their intention to leave the Army and will likely leave when their enlistment period is completed. Therefore, relying on IRR personnel to fill out units will also require setting higher recruiting targets later in the war to replace IRR personnel who separate. However, IRR activation could reduce the cadre mobilization delay to less than 36 months as IRR personnel would not require as much training as new recruits.

There is no additional cost to calling members of the IRR. However, there are drawbacks to this action as demonstrated by the IRR call-up in 2004.[126] In order for the IRR to be a viable source of manpower for cadre units in wartime, the Army must change the perception of the IRR. It must be treated as a pool of deployable manpower and the DoD must make this clear to army personnel. There are some indications that the DoD is already moving in this direction. In a 2004 report, the DoD stated its intention to increase the role of the IRR: "Access to the Individual Ready Reserve is being redefined to make IRR members a more viable source of military manpower and to provide greater depth of

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[124] This is based on an assumption that only 63 percent of those called to duty show up [Korb (2005)]. In total there are about 70,000 E-1 through E-4 personnel in the Army IRR.

[125] The other cadre augmented forces analyzed in the first paper would require recruiting increases in addition to IRR activation.

[126] PBS (2004), Napolitano (2007)

capabilities."[127] However, there is little indication as of early 2008 that this has been done. In order to create a pool of deployable manpower, the DoD may need to offer incentives such as bonuses or "muster pay" to individual ready reservists. This would reduce the cost savings from a cadre augmented force. Another concern with making the IRR more deployable is that this would lead to an increase in reenlistments in the active army and reduce the size of the IRR. Lawrence Korb described this phenomenon in the Army in 2008:

> "Others reenlisted because they knew if they got out after five years they would probably have been called back over the next three years by the Individual Ready Reserve. Major General Robert Scales, the former Commandant of the Army War College, has pointed out that eight years has become the new five-year obligation for West Point Graduates."[128]

If making the IRR more deployable leads to a smaller IRR, then there are fewer personnel to fill out cadre units. The DoD must carefully consider such a shift. The final concern with activating IRR personnel is the amount of training IRR personnel would need when activated.[129] However, there is plenty of time, at least 20 months, for individual ready reservists to be retrained before joining their cadre units.

In summary, the IRR alone could be used to fill out the six BCT cadre force in the early years. For other cadre forces, IRR activation could be used in combination with increases in end-strength to fill out cadre units in early years. Over the long-term, all cadre forces will require increasing end-strength because additional personnel will be needed to replace those who leave when their IRR obligation is complete.

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[127] DoD (2004), p. 28
[128] Korb (2008)
[129] Bodilly et al (1986)

IRR activation would require the DoD to make significant changes to IRR policies. Some of these changes, such as offering bonuses and muster pay, could reduce the cost savings from a cadre augmented force. These reductions would likely be small, less than one percent of the cost savings from the smallest cadre augmented force.[130]

5.2.4—An Overmanned RC

An alternative to the activation of the IRR is to offer bonuses to RC personnel to serve in cadre units. This would require purposely maintaining more personnel in the RC than are required to deploy with RC units. In wartime, the DoD would offer bonuses to junior RC personnel to serve in cadre units. These extra personnel would be relatively cheap to retain in peacetime.[131] However, the additional personnel costs of the reservists and the cost of the bonuses would both reduce the cost savings from a cadre augmented force. Maintaining junior personnel in the RC would decrease the cost savings from a cadre augmented force by about 25 percent.[132] In the worst case, assuming bonuses of $40,000[133],

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[130] If we assume that all 70,000 E-1 through E-4 personnel in the Army IRR were paid for the equivalent of four reserve drills ($179.60) to muster once a year, the cost would be about $12 million annually. This is one-third of one percent of the cost savings from the *+6 Cadre* force. (Reserve drill pay derived from: http://www.defenselink.mil/militarypay/pay/bp/paytables/fy2008_jan_4drill.pdf; accessed May 29, 2008). As of late 2007, the Army was offering reenlistment bonuses of $3,000 to individuals who enlist in the IRR for six years (http://www.military.com/benefits/military-pay/reserve-and-guard-pay/individual-ready-reserve-reenlistment-bonus, accessed December 10, 2007). In the worst case, if bonuses were paid to all 70,000 members of the Army IRR, this would increase costs by about $35 million annually ($210 million every six years). This is eight-tenths of one percent of the cost savings from the *+6 Cadre* force.

[131] However, they would be more expensive than IRR personnel.

[132] This assumes that all junior personnel for cadre units are maintained in the RC and cost, on average, $28,000 per year (0.28*$100,000). Average long-run annual cost savings from the *+6 Cadre*, *+9 Cadre* and, *+18 Cadre* forces would decrease from $4 to $3 billion, $6 to $4.4 billion, and $12 to $8.9 billion respectively. The average long-run savings from the *CadreMix* force would decrease from $11 billion to $8.2 billion.

[133] This is a worst-case assumption based on the bonuses offered to new recruits in the "Active First" program who commit to 48 months of active duty and the remainder of their military service obligation in the RC (http://www.military.com/recruiting/bonus-center/news/active-first-pays-big-bonuses; accessed May 28, 2008). It is more likely that bonuses would be around $10,000 to $20,000 per person. The Army offered some activated IRR personnel bonuses of $15,000 to enlist in the active Army and offered AC to RC affiliation

bonuses would further reduce the cost savings from each cadre augmented force by about 37 percent.[134] Under the most pessimistic assumption about the size of bonuses, this alternative could reduce the cost savings from a cadre augmented force by as much as 62 percent.[135] Nonetheless, even under the worst-case assumption, each cadre augmented force still reduces cost savings by billions of dollars.

This option avoids some of the issues with IRR activation because the junior personnel are volunteering to serve in cadre units rather than being called upon involuntarily. However, like the IRR activation option, it would also require making significant changes to DoD personnel policies. Additionally, RC personnel are generally older and of higher rank and therefore there may be a limited supply of junior personnel to draw upon. We calculate that 21 percent of the RC is in grades E-1 through E-4 while 44 percent of the AC and 61 percent of the IRR is in those grades.[136] Therefore, in order for the RC to be a viable source of junior personnel to fill out cadre units, a focused effort would need to be made to recruit additional junior personnel for the RC.

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bonuses of $10,000 in 2005. (http://www.globalsecurity.org/military/library/news/2005/06/mil-050617-arnews01.htm; accessed May 28, 2008)

[134] Average long-run annual cost savings from the *+6 Cadre*, *+9 Cadre* and, *+18 Cadre* forces would decrease from $4 to $2.5 billion, $6 to $3.8 billion, and $12 to $7.5 billion respectively. The average long-run savings from the *CadreMix* force would decrease from $11 billion to $7 billion. If bonuses were $10,000 ($20,000), cost savings would decrease by nine (18) percent. For each $10,000 increase in bonuses, cost savings decrease by an additional nine percent.

[135] In the worst case, average long-run annual cost savings from the *+6 Cadre*, *+9 Cadre* and, *+18 Cadre* forces would decrease from $4 to $1.5 billion, $6 to $2.2 billion, and $12 to $4.4 billion respectively. The average long-run savings from the *CadreMix* force would decrease from $11 billion to $4.3 billion. In the more realistic case of $15,000 bonuses, cadre cost savings would decrease by only 39 percent.

[136] Calculations based on grade breakdowns in DoD (2005). Holmes and Tan (2006) also state that Air Force Reservists and Air National Guardsmen are generally older than their active duty counterparts. Barnes (2006) says the same thing about the Army.

5.2.5—Filling Risk

Overall, the ability to fill out cadre units in wartime is a major risk of relying upon a cadre augmented force. We have seen that increased recruiting alone is unlikely to be able to fill cadre units at the rate assumed in the first paper. Actions such as IRR activation and offering bonuses to RC personnel could provide the additional personnel needed but both of these options will increase the peacetime cost of a cadre unit and require significant personnel policy changes by the DoD.

IRR activation or offering RC personnel bonuses to serve in cadre units can reduce recruiting concerns because they can "fill the gap" while cadre units mobilize at a rate slower than that assumed in the first paper. For example, a six BCT cadre force mobilizing at a rate of three BCTs per year, the rate assumed in the first paper, would take two years to mobilize. A six BCT cadre force mobilizing at a rate of one BCT per year, a rate that could be sustained by increased recruiting alone, would take six years to mobilize. While the three BCT per year force would be completely mobilized by year six of a war, the one BCT per year force would not be completely mobilized until year nine, near the end of a ten-year war. IRR activation would allow this cadre force to mobilize more rapidly. The IRR alone could initially fill out a six BCT force. While IRR personnel are serving in cadre units, recruiting could be increased at a rate of one BCT per year. If we assume that half of the IRR personnel leave when their contracts expire, it would take three years to mobilize a six BCT cadre force with half IRR personnel and half new recruits.[137] These scenarios are depicted in Figure 5.1.

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[137] If desired, increased recruiting could be continued through year nine when no more IRR personnel would be needed.

Figure 5.1—IRR Activation Reduces Size of Annual Recruiting Increases
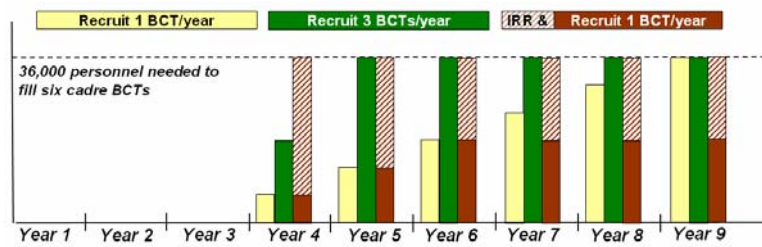
In the first paper of this dissertation, we assumed that cadre units would be mobilized at a rate of three BCTs per year so that all units would be ready to deploy over the course of a ten-year war. If both IRR activation and RC bonuses were not acceptable to the DoD, it might also consider a smaller cadre augmented force. A cadre force with that replaces three AC BCTs with three cadre BCTs would reduce average long-run annual costs by about $2 billion per year. This force could mobilize at a rate of one BCT per year and still have all cadre units available by year six of the war. To mobilize at this rate, recruiting would only need to be increased by about 6,000 personnel per year, two-thirds of the 2007 expansion rate. Smaller cadre forces that mobilize less rapidly can still save billions of dollars per year and could rely only on increased recruiting without the need to activate IRR personnel or offer bonuses to RC personnel.

5.3—TRAINING CADRE UNITS

Once a cadre unit is filled out, it must be trained. Both the individual soldiers and units must complete training before a cadre unit can deploy. This section explores the feasibility of training additional personnel and units during wartime. The first subsection examines options and constraints for training individual soldiers. The second subsection explores the feasibility of collective training for cadre units.

5.3.1—Individual Training

New recruits would need to go through both Basic Combat Training (BCT) and Advanced Individual Training (AIT) before joining their cadre unit. Previous cadre proposals have assumed that cadre leaders would train their own junior personnel. However, this may be detrimental to the effectiveness of a cadre unit if the cadre leaders need that time to perform their own training. In this subsection, we consider the possibility that cadre leaders must perform their own training and new recruits must be trained within the existing army individual training system. This would increase the demand on the Army's individual training system during wartime. If this training system is running at less than full capacity during peacetime then this is not an issue. However, if the individual training system is running at full capacity during peacetime, a cadre augmented force must invest in additional capacity.

Excess Capacity in the Existing Training System

To explore whether there is excess capacity in the individual training system, we examined the capacity for Basic Combat Training (BCT) at Fort Jackson.[138] We calculated that the maximum number of personnel that can be in training at Fort Jackson at any given time to be 13,500.[139] To determine volume, we derived data on the number of personnel being trained at Fort Jackson from the Army Training Requirements and Resources System (ATRRS).[140] Based on course scheduling information available in this database, we were able

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[138] We chose Fort Jackson because we were able to acquire the most data about its training capacity. Requests to other training centers for similar information were either ignored or denied. In addition, Fort Jackson performs the majority (about 56 percent) of basic training for new recruits.
[139] Correspondence with Public Affairs Officer at Fort Jackson (May 5, 2007). "Fort Jackson has 9 Basic Combat Training Battalions, each capable of supporting as many as 1,500 Soldiers in Training during a cycle." If all training battalions are busy, then Fort Jackson can train 13,500 recruits at a time (9*1500).
[140] https://atrrs.army.mil/. (Accessed December 6, 2007)

to estimate the number of recruits in the training system in each month from 2002 to 2006.[141] Figure 5.2 shows the number of recruits in the training system relative to the capacity from 2002 to 2006.

Figure 5.2—Fort Jackson Training Capacity
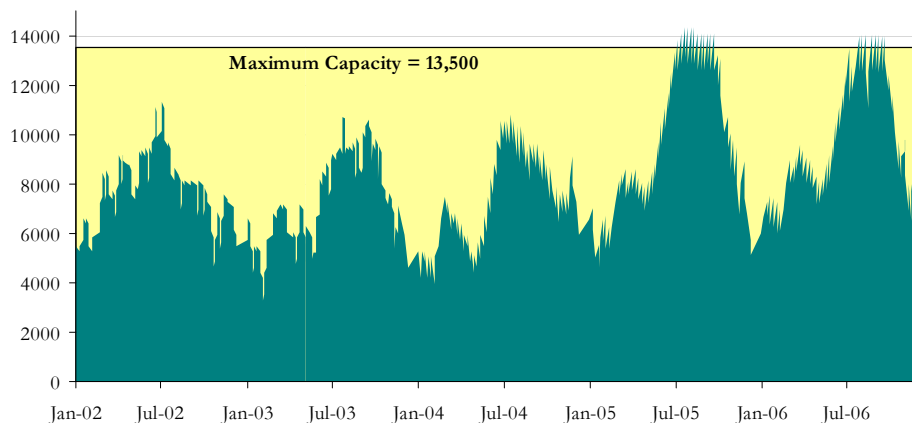
The number of recruits being trained at Fort Jackson increased substantially from 2004 to 2005. The peak volumes in 2005 and 2006 are near full capacity.[142] Training volumes are at their highest in the summer months (June-October) because many high school graduates begin their training during that time. As of 2005-2006, Fort Jackson had excess capacity only during off-peak times. Therefore, Fort Jackson could only increase the number of recruits being trained if they were brought in during off peak months.[143] We estimate that

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[141] We extracted the number of individuals scheduled to attend each basic training course (course number 750-BT) and their start and end times from 2001 to 2007 (we do not include 2001 and 2007 in our data because these years do not represent a steady-state). We entered this data into a Microsoft Excel spreadsheet and built a model that increments the number of personnel being trained when each course begins (by the appropriate class size) and decrements the number of personnel training when each course ends.

[142] From 2002-2004, Fort Jackson averaged about 7,000 recruits being trained at any given time. In 2005 and 2006, the average jumped to 9,000. The total number of new recruits dropped from 2004 to 2005 [CBO(2006), p. 5] so this difference seems to be the result of shifting BCT responsibilities among training centers rather than an increase in the overall number of recruits.

[143] The Fort Jackson Public Affairs Officer made this point in our correspondence: "Our early estimate is that we can absorb any directed increase - given that some 60% of our load is during the summer surge period (May-Oct), if we are able to bring more applicants in during the non-surge months." Also see Phillips (2007).

25,000 additional recruits per year could be trained at Fort Jackson if it was used at full capacity all the time.[144] This is higher than the annual number of new recruits in wartime under the cadre mobilization assumption made in the first paper of this dissertation.[145] Fort Jackson alone would be able to handle this additional workload. If we assumed a higher mobilization rate, there would likely also be excess capacity at other Army training sites. However, this assumes that new recruits could be brought in during off-peak times. Since most recruits enlist after graduating high school, some recruits initial entry might have to be delayed to achieve these increases. This could delay the mobilization of some cadre units.

Although we do not have the capacity information to do this same analysis for the other BCT and One-Station Unit Training (OSUT) sites, it is likely that the other training sites also have excess capacity only in the off-peak months. Figure 5.3 shows the training volume for each of the five Basic Combat Training sites and the One-Station Unit Training volume for infantry recruits at Fort Benning.[146]

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[144] This was calculated by subtracting the average number of personnel in the system in each month (an average of the 2005 and 2006 values) from the capacity of the system, summing these values, and dividing by the length of the training course in months (2.25 months).

[145] We assumed a mobilization rate of three BCTs per year in Paper I.

[146] Data extracted from the Army Training Requirements and Resources System (ATRRS).

Figure 5.3—BCT and OSUT Training Volumes by Site
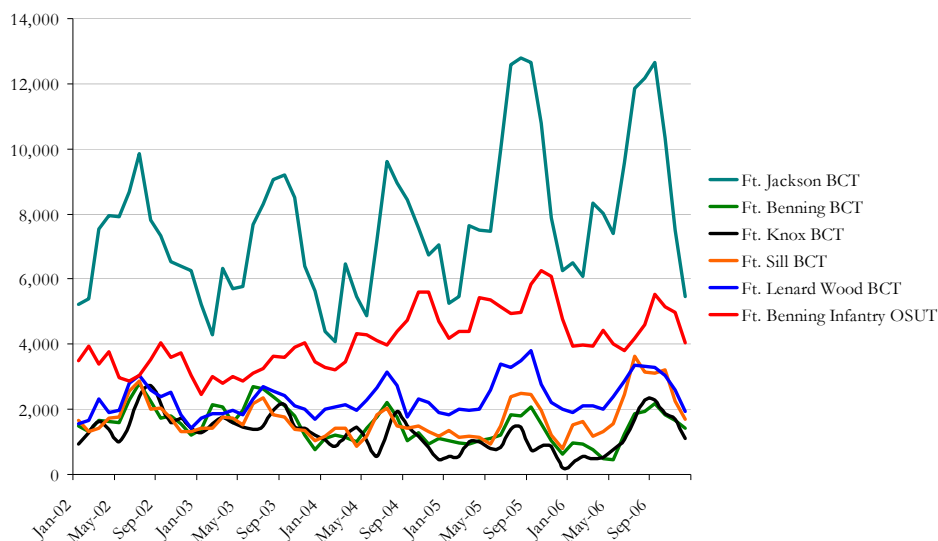
The other training sites show the same trends in volume as Fort Jackson with peaks in the summer months. These peaks are likely near capacity for each of the respective training sites since it is unlikely that the Army would maintain extra capacity beyond that needed to train the maximum anticipated recruit volume.[147] Therefore, these sites likely also have excess capacity only during the off-peak months. It is difficult the estimate the volume of this excess capacity without an estimate of the capacity at each site. However, we have already seen that the excess capacity at Fort Jackson is sufficient to train all of the new recruits under the cadre mobilization assumption made in Paper I of this dissertation. Additional excess capacity would only strengthen the argument that there is excess capacity that can be utilized in the off-peak months.

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[147] In 1996, the Government Accountability Office published a report outlining the opportunities available to the army to reduce the cost of training infrastructure by reducing excess capacity [GAO (1996)]. It appears that the Army has acted on these recommendations.

Overall, we have seen that the existing individual training system has excess capacity, but that this capacity is only available during off-peak times.[148] If the additional recruits called for by a cadre augmented force can be trained in these off peak times, then the Army will have no problem training personnel to fill out cadre units during wartime.[149] However, if new recruits can only be added on traditional recruiting schedules, the Army will have a more difficult time training new recruits in wartime. In this case, the Army might consider adding additional training capability during wartime.

Expanding Training Capacity in Wartime

If the Army cannot train recruits for cadre units in off-peak times during wartime, then we might consider temporarily expanding the capacity of the individual training system in wartime. This is exactly what is being done as of late 2007 to train additional recruits as part of the six BCT expansion. The FY 2008 supplemental budget request states that "the existing Army training sites cannot handle the workload within their current infrastructure," and requests additional funding "due to an increased need for temporary facilities to sufficiently train new Soldiers to standard as the Army continues to execute a needed over-strength of Soldiers in response to the Global War on Terrorism."[150] Temporary increases such as this might also be needed to train extra personnel for cadre units during wartime.

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[148] A full study would also examine the capacity constraints in the Advanced Individual Training (AIT) system as well. However, due to a lack of capacity data, we were unable to pursue this analysis further. Our conclusions are based on the assumption that excess capacity in the AIT system is similar to that in the BCT system.

[149] Donnelly and Kagan (2008b) argue that the existing training base is too small for an expansion: "Army leaders have often indicated that the lessened 'throughput' capacity of their training pipeline is an equally constraining factor for expansion." [Donnelly and Kagan (2008b), p. 111] However, Donnelly and Kagan assume an expansion rate of 30,000 per year, four times larger than that assumed in the first paper of this dissertation.

[150] Department of the Army (2007b), p. 10. More specifically, these funds were for "relocatable facilities support, base support, the Basic Officer Leadership Course, and the Warrior Training Course."

Dewar et al argue that training capacity could be "greatly increased" in wartime, they argue: "the training tempo could be increased with the greater use of all training facilities. Class sizes could grow, hours of use could increase, and the rate of training at current USATCs *(U.S. Army Training Centers)* and schools could substantially increase. In addition, more USATCs and schools could be opened quickly, if required."[151] All of these would come with additional costs. For FY 2008, the Army requested less than $1 million to train additional personnel as part of the expansion.[152] In wartime, a cadre augmented force could require similar expenditures. Given the magnitude of the cost, this would have little impact on the cost savings from a cadre augmented force.

It appears that training capacity is not a great concern for a cadre augmented force. If additional new recruits can be trained during off-peak times, the existing individual training system has enough excess capacity to meet the demands of each of the cadre augmented forces examined in this dissertation. If additional recruits cannot be added in off-peak times, the Army might temporarily expand the training system as it plans to in FY 2008. Even if the Army temporarily expanded the training system, the additional cost would not exceed the cost of the training infrastructure that would be required to maintain the equivalent-sized non-cadre force. Therefore, even if additional costs are incurred during wartime, this does not increase the cost of a cadre augmented force relative to the same sized regular force.

The relevance of the discussion in this section depends on whether or not cadre leaders would be assigned the task of training new recruits during wartime. If cadre leaders

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[151] Dewar et al (2000), p. 45

[152] The Army requested $2 million to support three separate needs: AC overstrength, personnel support, and recruiting and retention. The Army does not break these out separately, but it seems fair to assume that the AC overstrength component is less than half of this amount. [Department of the Army (2007b), p. 10]

must participate in training themselves, then new recruits must be trained in the existing

individual training system. This is more likely to be the case for cadre units that have low

mission focus (dual-hatted, senior IRR) than it is for those that spend a significant amount

of time planning for war (maintenance, AC units with surplus personnel). Nonetheless, even

if cadre leaders cannot train new recruits in wartime, we have seen that there is excess

capacity within the existing training system that could be utilized.

5.3.2—Collective Training

Once a cadre unit has been filled out with trained junior personnel, it begins

collective training. Some of this training would occur at the unit's home base. However,

since the base will likely not be large enough for a full BCT to maneuver, each cadre BCT

will also require about a month[153] of training at a collective training site such as the National

Training Center (NTC) or Joint Readiness Training Center (JRTC).

Unlike the capacity of the individual training system, the capacity of the collective

training system does not constrain the ability of a cadre augmented force to mobilize. This is

due to the nature of fighting a war with rotation. If each year, 19 new BCTs must be

deployed, each of those brigades will rotate through the collective training sites before being

deployed. Therefore, the capacity of the collective training system only needs to be large

enough to handle the 19 BCTs rotating through each year, no matter which type.[154] We

estimate that when running at full capacity, the collective training system can train about 24

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[153] Blain (2006), p. 3. Department of the Army (2007d), p. 1.

[154] More rotation slots would be required for RC BCTs because they must rotate at a faster pace because they only provide eight months boots on the ground per deployment versus the twelve months provided by AC and cadre units. However, this difference would only matter for a force with a much higher proportion of RC units than any of those analyzed in this dissertation.

BCTs per year.[155] This is large enough to support even the largest rotational force examined in this dissertation, the +18 BCT force, which can sustain 23 BCTs deployed in each year. Therefore, collective training capacity is not an issue for a cadre augmented force insomuch as it is not an issue for any of the non-cadre forces used as comparisons in this dissertation.

5.4—DEMOBILIZING CADRE UNITS

Near the end of a long war, as requirements for deployed forces begin to decrease, cadre units would be demobilized. There are a number of concerns with demobilizing cadre units. First, there is a question of choosing the appropriate time to demobilize cadre units. We would not want to demobilize units only to need them again in the near future. A second issue is reducing end-strength. The number of junior personnel in the force must be reduced as cadre units are demobilized. This may require the use of incentives such as separation bonuses.

5.4.1—Timing

In Section 5.1, we discussed the timing of the activation of cadre units. We argued that the Army should set in place a policy in peacetime that would help dictate when cadre units should be mobilized in wartime. Similarly, this policy should also be explicit about when cadre units should be demobilized. Like the activation policy, this policy could dictate that cadre units be demobilized when the requirement for deployed forces drops below the level that AC forces can sustain at rotation guidance for more than one year. This provides

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[155] This assumes two collective training centers training a new BCT every 30 days. The Government Accountability Office estimates an even larger number (28-32) of BCTs that can be trained pet year based on three combat training centers (they include the Joint Multinational Readiness Center) [GAO (2007c), p. 6]. In any case, the number of BCTs that can be trained is much higher than that which the rotational force can sustain in a given year.

some leeway if requirements drop for a short period of time and then rebound. Although

guidance should be provided in peacetime, the actual wartime decision will be based on

projections and the best knowledge of decision-makers at that time.

5.4.2—Reducing End-Strength

When cadre units are demobilized, end-strength will return to peacetime levels. End-

strength could be reduced in a number of ways. First, the Army can decrease recruiting

targets and first term retention. To decrease the number of new recruits, the Army could

reduce enlistment bonuses, the number of recruiters, and/or advertising expenditures.

Decreasing first term retention levels could be done with a combination of lower promotion

rates and lower reenlistment bonuses.

Decreasing recruiting targets and first term retention may not be enough to reduce

the size of the Army at the end of a war. The Army may also need to offer bonuses to junior

personnel bonuses to leave the Army. During the Cold War drawdown, the Army offered

separation bonuses to individuals that volunteered to leave the Army. Personnel were

offered the option of an annuity, called the Voluntary Separation Incentive (VSI), or a lump-

sum payment, called the Special Separation Benefit (SSB) program.[156] Offering these types of

incentives would decrease the cost savings from a cadre augmented force. If we assume that

the DoD would offer a lump-sum separation incentive of $25,000[157] to 68 percent[158] of

junior personnel in a cadre augmented force, this would reduce the cost savings from a cadre

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[156] Asch and Warner (2001), p. 1

[157] This was the lump-sum payment (SSB) offered to E-5 personnel with ten years of experience during the Cold War drawdown [Asch and Warner (2001), p.5].

[158] This is the fraction of Air Force personnel that were offered separation incentives in 1992 relative to the size of the planned end-strength reduction for the Air Force. [Asch and Warner (2001), p. 7, 19] Similar information was not available for the Army. [Asch and Warner (2001), p. 19]

augmented for by about 15 percent.[159] Even when we include the cost of separation

bonuses, each cadre augmented force still reduces annual costs by billions of dollars.

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[159] Average long-run annual cost savings from the *+6 Cadre*, *+9 Cadre* and, *+18 Cadre* forces would decrease from $4 to $3.4 billion, $6 to $5 billion, and $12 to $10 billion respectively. The average long-run savings from the *CadreMix* force would decrease from $11 billion to $9.3 billion. If separation bonuses were $15,000 ($35,000), cost savings would decrease by nine (22) percent. For each $10,000 increase in bonuses, cost savings decrease by about an additional seven percent.

6.   CONCLUSION

There are a myriad of different design alternatives for a cadre augmented force. Each of these alternatives has an effect on cost and military risk. In this paper, we broke these alternatives into two groups: peacetime and wartime. We further distinguished these groups along a number of dimensions. This paper has presented the alternatives for each of these dimensions and discussed the cost and risk implications of each. This chapter summarizes the alternatives and assesses the overall results.

6.1—THE ALTERNATIVES

The design of a peacetime cadre unit has three dimensions: structure, organization, and equipment. Table 6.1 defines each of these dimensions and presents the alternatives we explored in this paper.

Table 6.1—Peacetime Cadre Alternatives

Dimension	Definition	Alternatives
Structure	The number and grade profile of personnel retained in a cadre unit during peacetime.	♦ All officers and NCOs ♦ Senior officers and NCOs ♦ Increased promotions ♦ IRR activation ♦ Increased promotions & IRR activation
Organization	The peacetime duties of the cadre leaders and how they are organized in the total force during peacetime.	♦ Separate cadre units • Maintenance • Domestic training • Foreign army training ♦ Cadre within existing force structure • AC units with surplus personnel • RC units with surplus personnel • Senior IRR • TTHS ♦ Rotating cadre units ♦ Use existing officers
Equipment	The amount of equipment a cadre unit maintains in peacetime.	♦ Full equipment sets ♦ Rotational equipment sets ♦ Relying on the industrial base

In our analysis of cadre structures, we found that the cost of retaining cadre leaders during peacetime ranges from nine (assuming promotion increases and IRR activation) to 56 (all officers and NCOs) percent of an AC unit. As we explored different peacetime organizations, we found that the peacetime cost could be reduced significantly if cadre leaders are dual-hatted (foreign, domestic army training) or retained in non-training status (RC, senior IRR) during peacetime. We found that a senior IRR can reduce the peacetime cost of a cadre unit to as little as five percent of an AC unit. Equipment strategies also affect the relative cost of cadre units during peacetime. In our analysis of equipment alternatives, we found that full equipment sets are the most expensive alternative, but have the lowest risk. Relying on rotational equipment sets or the industrial base also reduces the relative cost of a cadre unit, but increases risk. However, the decrease in the annual cost of a cadre unit from different equipping strategies appears to be small compared to annual personnel and operations and maintenance costs.

In wartime, cadre units must be activated, filled out, trained, and demobilized. Table 6.2 defines these dimensions and discusses the results of our analyses.

Table 6.2—Wartime Cadre Concerns

Dimension	Definition	Concerns
Activation	The length of time it takes from the beginning of a war for cadre units to be mobilized.	♦ Requires Congressional funding ♦ Congress unlikely to make concessions to allow for cadre mobilization without its approval

Filling	The source of personnel to fill out cadre units during wartime.	♦ Increasing end-strength
		  • Annual increases in end-strength are <u>double</u> the increases required for 2007 force structure increase. Unlikely to achieve this in future wars.
		♦ Activate IRR
		  • Enough junior personnel in IRR to fill out *+6 Cadre* force in short-term and to augment recruiting for other forces.

		- IRR activation is controversial. Significant changes would be needed to personnel policies. - Could reduce cost savings from smallest cadre augmented force by less than one percent. ♦ Offer RC bonuses - Could reduce cost savings from cadre augmented force by as much as 62 percent. - Would require significant changes to personnel policies.
Training	The ability to train additional personnel and units in wartime.	♦ Individual Training System - Training performed either by unit cadre leaders or in existing training system during off-peak months. There is sufficient capacity for off-peak training. ♦ Collective Training - For wars fought with rotation, cadre units place no additional demand on the collective training system.
Demobilization	The process by which cadre units are removed from service and returned to a peacetime state.	♦ Timing - Uncertainty. ♦ End-strength Decreases - Lower first term promotion and retention rates. - May also require separation incentives that could reduce cost savings from a cadre augmented force by as much as 15 percent.

The activation process could be constrained by two factors: funding from Congress and declaration of war by the president. Delays in either of these would reduce the attractiveness of a cadre augmented force.[160] After being activated, cadre units can be filled out with junior personnel by increasing end-strength, activating the IRR, and/or offering bonuses to RC personnel to serve in cadre units. We found that increased recruiting alone is insufficient to fill out cadre units at the rate assumed in the first paper. The recruiting increases required by a cadre augmented force with a mobilization rate of three BCTs per

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[160] See Paper I for an analysis of the effect of cadre readiness on the attractiveness of a cadre augmented force.

year are of twice the size of those required to increase the force by six BCTs over four years

as of 2007. We found that the IRR could fill out the entire *+6 Cadre* force over the short-

term but that recruiting increases would be needed to replace IRR personnel who separate in

later years. We also considered offering bonuses to RC personnel to serve in cadre units.

Some combination of increased recruiting, IRR activation, and RC bonuses could provide

the junior personnel needed to fill out cadre units. However, both IRR activation and RC

bonuses would require significant changes to personnel policies. Additionally, the cost of

bonuses and of retaining junior personnel in the RC could reduce the cost savings from a

cadre augmented force by as much as 62 percent. The ability to fill out cadre units is the

major risk of relying upon a cadre augmented force.

6.2—ASSESSMENT

This paper shows that a cadre augmented force could work in practice. However,

some of the results in this paper raise concerns. We found that the cost of cadre leaders in

peacetime could be as high as 56 percent of an AC unit.[161] This motivated us to consider

other organizations. We considered the possibilities of both dual-hatting cadre leaders and

retaining them in reserve status. In our view, retaining cadre leaders in reserve organizations

is the most attractive alternative. As long as they are prior service personnel, there is

sufficient time for cadre leaders retained in reserve status to hone their skills before their unit

would be deployed. These units can cost as little as two percent of an AC unit.

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[161] When a cadre unit cost 56 percent of an AC unit, the average long-run annual cost savings from the +6, +9, and +18 BCT cadre forces are still $2, $3, and $7 billion respectively and the cost savings from the *CadreMix* force is $6 billion.

We also discussed whether it would be feasible to recruit and train the number of personnel required to fill out cadre units in wartime. In our discussion of recruiting, we calculated that the annual recruiting increase would need to be about twice as large as that which was called for in 2007. However, the 2007 force expansion appears to be taking place by increasing both retention and recruiting.[162] The actual size of the recruiting increase may be more than double that which is taking place as of 2007. Therefore, we concluded that increased recruiting alone could not fill out cadre units at the rate assumed in the first paper. We argue that activating IRR personnel or offering RC personnel bonuses could alleviate this concern to some extent. However, these alternatives can increase costs and would require significant changes to army personnel policies.

Overall, we found that it is worth considering more novel approaches than have been suggested for cadre units in the past. These novel approaches include: relying on increased promotions and IRR activation to procure additional officers during wartime, dual-hatted or reserve cadre leaders, providing less than full equipment sets for cadre units during peacetime, and offering RC personnel bonuses to serve in cadre units. All of these approaches come with risks that have been discussed in this paper. These risks should be considered carefully against the additional cost savings they can provide. Together, the first and second papers of this dissertation provide the framework to consider these tradeoffs.[163]

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[162] Recruiting goals have increased only slightly since 2002 while retention goals have increased 13% since 2002. [IISS (2007)] The reason for this is explained in IISS (2007): "the units the army seeks to create as part of the higher end-strength will require experienced and 'retained' officers and NCOs: ground forces have to grow 'sideways,' rather than from the bottom up, to avoid large numbers of new recruits, lacking training and leadership, in units thus unable to function as intended."

[163] Both the first and second papers of this dissertation explore tradeoffs for Brigade Combat Teams (BCTs) because there is the most public information available about these units. The analyses in this paper should also be performed for Combat Support (CS) and Combat Service Support (CSS) units because some of these types of units could also be maintained in cadre status to reduce costs. Further, some of these types of units would

be in higher demand in the later stages of a war and stabilization operation making them more attractive as cadre units. [Watson (2005)]

APPENDIX A—BCT STRUCTURE

The second chapter of this paper analyzes alternative peacetime structures for a cadre Brigade Combat Team (BCT). We based these structures on the structure of an infantry BCT. This appendix shows the grade structures for each of the three types of BCTs: infantry, Stryker, and heavy. We derived these structures from U.S. Army Armor Center (2005). The first section shows the grade structure of an infantry BCT. The second and third sections show the grade structures for Stryker and heavy BCTs.

A.1—INFANTRY BRIGADE COMBAT TEAM

It is likely that many cadre BCTs would be infantry BCTs because these are the types of units generally needed in the later stages of war (counter-insurgency operations) and are easier to train and equip quickly. Figure A.1 shows the grade structure of an infantry BCT as extracted from Army Armor Center (2005).

Figure A.1—Grade Structure of an Infantry BCT

		Headquarters	Brigade Special Troops Batallion	Infantry Batallions	Reconaissance Squadron	FIRES Batallion	Brigade Support Batallion	Total	Percent
OFFICERS	Lieutenant (O-1 and O-2)	2	14	58	19	11	25	**129**	3.7%
	Captain (O-3)	21	12	30	14	12	24	**113**	3.3%
	Major (O-4)	20	2	4	2	2	6	**36**	1.0%
	Lieutenant Colonel (O-5)	3	1	2	1	1	1	**9**	0.3%
	Colonel (O-6)	2	0	0	0	0	0	**2**	0.1%
	Total	48	29	94	36	26	56	**289**	8.3%
	Chief Warrant Officer 1 & 2 (CW1, CW2)	5	5	0	0	1	23	**23**	0.7%
	Chief Warrant Officer 3 (CW3)	4	0	0	0	0	5	**5**	0.1%
	Chief Warrant Officer 4 (CW4)	1	0	0	0	0	2	**2**	0.1%
	Chief Warrant Officer 5 (CW5)	0	0	0	0	0	0	**0**	0.0%
	Total	10	5	0	0	1	30	**30**	0.9%
ENLISTED	Private (E-1 through E-3)	14	91	364	94	72	223	**858**	24.7%
	Specialist / Corporal (E-4)	19	132	486	108	81	298	**1124**	32.4%
NCOs	Sergeant (E-5)	17	84	238	59	55	156	**609**	17.6%
	Staff Sergeant (E-6)	21	40	128	39	34	81	**343**	9.9%
	Sergeant First Class (E-7)	20	23	46	20	15	36	**160**	4.6%
	First / Master Sergeant (E-8)	6	6	10	5	7	10	**44**	1.3%
	(Command) Sergeant Major (E-9)	3	1	4	2	1	1	**12**	0.3%
	Total	100	377	1276	327	265	805	**3150**	90.8%
SUMMARY	**Total**	158	411	1370	363	292	875	**3469**	
	% Officer & Warrant Officers (WO)	37%	8%	7%	10%	9%	8%	**9%**	
	% Non-comissioned Officers (NCOs)	42%	37%	31%	34%	38%	32%	**34%**	
	% Officer & WO & NCOs	79%	46%	38%	44%	48%	40%	**43%**	

A.2—STRYKER BRIGADE COMBAT TEAM

Cadre units could also be Stryker BCTs. These units are also useful in counter-insurgency operations. The overall grade structure of a Stryker BCT is similar to that of an infantry BCT as shown in Figure A.2.

Figure A.2—Grade Structure of a Stryker BCT

		Headquarters	Engineer Company	Military Intelligence	Signal Company	Antiarmor Company	Infantry Batallions	RSTA Squadron	FA Batallion	Brigade Support Batallion	Total	Percent
OFFICERS	Lieutenant (O-1 and O-2)	1	5	4	4	5	81	22	14	11	147	4%
	Captain (O-3)	20	1	1	1	1	42	14	12	22	114	3%
	Major (O-4)	14	0	0	0	0	6	2	2	7	31	1%
	Lieutenant Colonel (O-5)	1	0	0	0	0	3	1	1	1	7	0%
	Colonel (O-6)	2	0	0	0	0	0	0	0	0	2	0%
	Total	38	6	5	5	6	132	39	29	41	301	8%
	Chief Warrant Officer 1 & 2 (CW1, CW2)	7	0	4	2	0	0	2	2	4	21	1%
	Chief Warrant Officer 3 (CW3)	3	0	0	0	0	0	0	0	9	12	0%
	Chief Warrant Officer 4 (CW4)	0	0	0	0	0	0	0	0	1	1	0%
	Chief Warrant Officer 5 (CW5)	0	0	0	0	0	0	0	0	0	0	0%
	Total	10	0	4	2	0	0	2	2	14	34	1%
ENLISTED	Private (E-1 through E-3)	13	18	16	12	11	474	76	83	159	862	22%
	Specialist / Corporal (E-4)	17	67	23	17	16	765	139	121	186	1351	34%
NCOs	Sergeant (E-5)	11	24	16	13	14	474	117	60	132	861	22%
	Staff Sergeant (E-6)	12	15	11	11	5	183	49	35	49	370	9%
	Sergeant First Class (E-7)	16	5	3	5	3	66	23	16	28	165	4%
	First / Master Sergeant (E-8)	4	1	1	1	1	12	5	7	7	39	1%
	(Command) Sergeant Major (E-9)	3	0	0	0	0	6	2	1	1	13	0%
	Total	76	130	70	59	50	1980	411	323	562	3661	92%
SUMMARY	Total	124	136	79	66	56	2112	452	354	617	3996	
	% Officer & Warrant Officers (WO)	39%	4%	11%	11%	11%	6%	9%	9%	9%	8%	
	% Non-comissioned Officers (NCOs)	37%	33%	39%	45%	41%	35%	43%	34%	35%	36%	
	% Officer & WO & NCOs	76%	38%	51%	56%	52%	41%	52%	42%	44%	45%	

A.3—HEAVY BRIGADE COMBAT TEAM

While it is unlikely that many cadre BCTs would be heavy BCTs because of the nature of post-war operations, heavy BCTs have been deployed extensively to Iraq and Afghanistan. Therefore, we also looked at the grade structure of a heavy BCT. We found that the grade structure for a heavy BCT is also similar to that of infantry and Stryker BCTs as shown in Figure A.3. The heavy BCT has a slightly higher percentage of officers and NCOs than the other BCTs, but overall its grade structure is not significantly different.

Figure A.3—Grade Structure of a Heavy BCT

		Headquarters	Brigade Special Troops Batallion	Maneuver Batallions	Armed Reconaissance Batallion	FA Batallion	Brigade Support Batallion	Total	Percent
OFFICERS	Lieutenant (O-1 and O-2)	2	11	62	17	11	27	**130**	3.4%
	Captain (O-3)	20	11	34	14	12	24	**115**	3.0%
	Major (O-4)	20	2	4	2	2	7	**37**	1.0%
	Lieutenant Colonel (O-5)	3	1	2	1	1	1	**9**	0.2%
	Colonel (O-6)	4	0	0	0	0	0	**4**	0.1%
	Total	49	25	102	34	0	0	**295**	7.8%
	Chief Warrant Officer 1 & 2 (CW1, CW2)	7	5	0	0	4	12	**28**	0.7%
	Chief Warrant Officer 3 (CW3)	3	0	0	0	0	3	**6**	0.2%
	Chief Warrant Officer 4 (CW4)	1	0	0	0	0	1	**2**	0.1%
	Chief Warrant Officer 5 (CW5)	0	0	0	0	0	0	**0**	0.0%
	Total	11	5	0	0	4	16	**36**	0.9%
ENLISTED	Private (E-1 through E-3)	16	68	276	73	82	245	**760**	20.0%
	Specialist / Corporal (E-4)	23	99	506	125	121	411	**1285**	33.8%
NCOs	Sergeant (E-5)	20	65	288	68	59	266	**766**	20.2%
	Staff Sergeant (E-6)	22	32	156	54	39	115	**418**	11.0%
	Sergeant First Class (E-7)	20	20	54	18	16	53	**181**	4.8%
	First / Master Sergeant (E-8)	7	5	14	4	5	11	**46**	1.2%
	(Command) Sergeant Major (E-9)	3	1	4	2	1	1	**12**	0.3%
	Total	111	290	1298	344	323	1102	**3468**	91.3%
SUMMARY	Total	171	320	1400	378	353	1177	**3799**	
	% Officer & Warrant Officers (WO)	35%	9%	7%	9%	8%	6%	**9%**	
	% Non-comissioned Officers (NCOs)	42%	38%	37%	39%	34%	38%	**37%**	
	% Officer & WO & NCOs	77%	48%	44%	48%	42%	44%	**46%**	

A.4—SUMMARY

Overall, the grade structures of the infantry, Stryker, and heavy BCTs are very similar. For all BCTs, officers comprise about eight to nine percent of a unit while NCOs comprise 34 to 37 percent of a unit. On average, officers and NCOs comprise about 45% of a BCTs end-strength. Chapter Two explores alternative cadre structures based on the structure of an infantry BCT. The substantive results in Chapter Two would not be significantly different if Stryker or heavy BCTs we maintained as cadre units.

APPENDIX B— THE PEACETIME COST OF A CADRE BCT

The second chapter of this paper estimates the cost of various peacetime cadre unit configurations. There are two main components to the peacetime cost of a cadre BCT: the direct costs of a unit and the percentage of time that cadre leaders are involved in duties directly related to the cadre unit. This appendix shows how we calculate the peacetime cost of a cadre BCT relative to an AC BCT under varying assumptions about cadre unit structure. The first section of this appendix shows how we calculate the direct cost of a cadre unit relative to an AC unit. The second section shows how we determine the relative cost of cadre units with different peacetime duties.

B.1—CADRE UNIT RELATIVE COST

In Chapter Two of this paper, we outlined five potential peacetime structures for cadre units and calculated the cost of each relative to an AC unit. This section shows how we calculated these costs.

B.1.1—Assuming Unit Costs are Proportional to Personnel Costs

In this paper, we assume that the cost of a cadre BCT relative to an AC BCT is proportional to the percentage difference in personnel costs of the two units. This implicitly assumes that the percentage difference in all other costs (operations and maintenance, etc.) is proportional to the percentage difference in personnel costs. Although this assumption is questionable, there is some evidence that it might be good enough for the purpose of developing a relative cost estimate. Bailey (1991) estimates the unit cost components for a

variety of different types of "reserve" units (cadre and RC).[164] Using these cost estimates, we

find that the percentage difference in cost for each of the reserve forces relative to an AC

BCT is almost equal for each of the cost components (military pay, operations and

maintenance, and other). Table B.1 shows the relative cost for each cost component and

each of the reserve forces examined in Bailey (1991).[165]

Table B.1—Cost of "Reserve" Forces in Bailey (1991) Relative to AC BCT

Unit Type	Military Pay	Operations and Maintenance	Other	Total
RC	22%	22%	31%	22%
AC Leadership	18%	21%	13%	19%
RC Leadership	4%	3%	3%	4%
AC Full Structure	30 %	34%	28%	31%
RC Full Structure	6 %	6%	6%	6%

For each of the reserve forces examined in Bailey (1991), the relative military pay

costs are almost exactly the same as the relative total costs. The only unit structures that do

not have exactly the same ratio for military pay and total cost are AC Full Structure (30 vs.

31 percent) and AC Leadership (18 vs. 19 percent). These differences are minor. Based on

this, we think it is fair to assume that changes in the overall cost of a cadre unit relative to an

AC unit will be proportional to changes in the personnel costs.[166] The following subsection

shows how we calculate relative personnel costs for different cadre unit structures.

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[164] Bailey (1991), p. C-2

[165] Bailey (1991) examines five types of "reserve" units: a RC unit and four types of cadre units. The four types of cadre units are defined by two factors: the status of cadre leaders in peacetime (AC/RC) and the distribution of cadre leaders. The AC and RC leadership cadre units "retain a large number of the senior personnel of the division to preserve skills and experience" while the AC and RC full structure cadre units "retain some of the critical leadership positions and some of the soldier positions to facilitate realistic training and maintenance." [Bailey (1991), p. 13]

[166] This assumption would also fail if other cost components varied disproportionately to military pay by grade.

B.1.2—Personnel Cost

The personnel cost of a cadre unit relative to an AC unit depends on two things: the number of personnel retained in each grade and the relative cost of personnel in each grade. Chapter Two outlines five possible cadre grade structures specifying the number of personnel retained in each grade for each. Given these structures, we only need to calculate the relative cost of personnel in each grade to calculate the overall personnel cost of a cadre unit. Under the assumption described in the previous section, we use relative personnel cost as an estimate of the relative total cost of a cadre unit throughout this paper.

Personnel costs could be measured in any number of ways. However, because the analyses in this dissertation focus on relative cost, we do not need to have a perfect measure of total personnel costs, but instead to have a reasonable measure of the relative cost of soldiers in different grades. We decided that the simplest and most transparent way to do this would be to base the relative cost of personnel on the difference in annual total compensation for the average soldier in each grade. We used data provided in the Fiscal Year 2008 Army Personnel budget justification to calculate total compensation. From this data, we calculated how basic pay, allowances for housing and subsistence, and retirement accrual costs varied across grades.[167] Figure B.1 shows how annual total compensation varies by grade.

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[167] We calculated compensation by summing basic pay, BAH (weighed by: the fraction of domestic and overseas personnel with or without dependents, bachelors, and in substandard conditions), BAS, and retirement accrual from Department of the Army (2007a). This calculation does not include accrual for veterans' benefits or tax advantages because these are not broken down by grade in Department of the Army (2007a). CBO (2007) includes these values in their calculation of average compensation for enlisted personnel. Section B.1.3 shows how our estimates compare.

Figure B.1—Annual Total Compensation by Grade

Pay Grade	Annual Total Compensation
O-1	$69,362
O-2	$78,951
O-3	$99,614
O-4	$112,185
O-5	$123,333
O-6	$141,394
W-1	$78,970
W-2	$85,783
W-3	$99,977
W-4	$108,756
W-5	$128,629
E-1	$31,041
E-2	$34,381
E-3	$36,205
E-4	$41,931
E-5	$51,489
E-6	$61,922
E-7	$71,722
E-8	$79,688
E-9	$94,888

To calculate the cost of a cadre unit relative to an AC unit, we began by multiplying the number of soldiers in each grade by their compensation shown in Figure B.1 and summed the results. We did this for an AC unit and for each cadre structure. Then, we calculated the ratio of the total personnel cost of each type of cadre unit to the total personnel cost of an AC unit. Figure B.2 shows the relative cost calculation for the cadre unit retaining all officers and NCOs.

Figure B.2—Relative Cost Calculation for All Officers and NCO Cadre Unit

	Pay Grade	Per Soldier	AC BCT	Cost AC	Cadre BCT	Cadre BCT	Cost Cadre
OFFICERS	O-1 and O-2	$74,157	129	$9,566,253	100%	129	$9,566,253
	O-3	$99,614	113	$11,256,382	100%	113	$11,256,382
	O-4	$112,185	36	$4,038,660	100%	36	$4,038,660
	O-5	$123,333	9	$1,109,997	100%	9	$1,109,997
	O-6	$141,394	2	$282,788	100%	2	$282,788
	CW1 & CW2	$82,377	23	$1,894,671	100%	23	$1,894,671
	CW3	$99,977	5	$499,885	100%	5	$499,885
	CW4	$108,756	2	$217,512	100%	2	$217,512
	CW5	$128,629	0	$0	100%	0	$0
ENLISTED	E-1 through E-3	$33,876	858	$29,065,608	0%	0	$0
	E-4	$41,931	1124	$47,130,444	0%	0	$0
NCOs	E-5	$51,489	609	$31,356,801	100%	609	$31,356,801
	E-6	$61,922	343	$21,239,246	100%	343	$21,239,246
	E-7	$71,722	160	$11,475,520	100%	160	$11,475,520
	E-8	$79,688	44	$3,506,272	100%	44	$3,506,272
	E-9	$94,888	12	$1,138,656	100%	12	$1,138,656
SUMMARY	Total		3469	$173,778,695	43%	1487	$97,582,643
Cost of Cadre BCT Relative to AC BCT =					56%		

We calculated that the annual personnel cost of an AC BCT was $173,778,695 and that the annual personnel cost of a cadre unit retaining all officers and NCOs was $97,582,643. Using these two values, we calculate the relative cost of this cadre unit to be 56 percent of an AC unit. This calculation was repeated for each of the cadre configurations discussed in Chapter Two of this paper.

B.1.3—Validity of Relative Personnel Costs

In the previous section, we calculated the relative cost of a soldier in each grade based on data from Department of the Army (2007a). To validate these calculations, we compared the rate of increase in compensation in our calculation to that calculated in CBO (2007b) for enlisted personnel.[168] Figure B.3 shows the percentage increase in compensation for enlisted soldiers in each pay grade.

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[168] CBO (2007b) only calculates average compensation by grade for enlisted personnel, not officers.

Figure B.3—Trend in Annual Basic Pay vs. Total Compensation for Enlisted Personnel
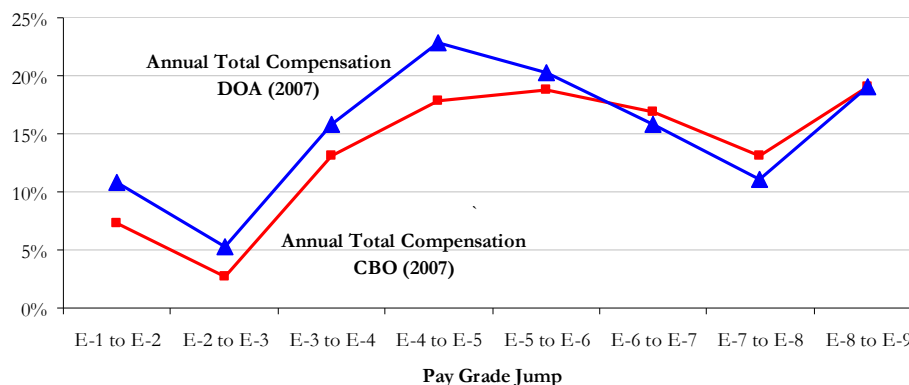
Figure B.3 shows that our estimate for enlisted personnel compensation by grade is similar to that in CBO (2007b). The percentage increase in total compensation is slightly higher in our model because the CBO (2007b) calculation includes additional cost components (veterans' health accrual, tax benefits) that increase the overall cost in each grade but do not increase significantly from grade to grade. This explains the lower percentage increase in cost in CBO (2007). These differences have a slight effect on the relative cost results reported in this paper. The higher the average increase in compensation, the higher the relative cost of a cadre BCT because it retains personnel in higher grades. Therefore, the compensation model used in this paper slightly overestimates the relative cost of a cadre unit during peacetime. To get a sense of the magnitude of this overestimation, we calculated the relative cost of just the enlisted personnel in each of the five cadre BCT types for both our cost model and that in CBO (2007b). Table B.2 shows the results.

Table B.2—Cadre Unit *Enlisted* Relative Cost under Different Compensation Models

Cadre Force	Our Model	CBO (2007b)
All NCOs	47 %	46 %
Senior NCOs	26 %	25 %

Increase Promotion (9 BCT)	20 %	19 %
Activate IRR (9 BCT)	24 %	23 %
Combination (9 BCT)	18 %	17 %

We can see from Table B.2 that our model slightly overestimates the cost of the enlisted component of a cadre unit relative to CBO (2007b). This overestimation is very small- one percent for each of the cadre forces examined here. This slight difference is likely to occur for officers and warrant officers as well.

B.2—INTERGRATING PEACETIME DUTIES AND COST

After calculating the relative difference in cost between a cadre and AC unit, we calculate the overall cost of the cadre unit by multiplying the relative cost as calculated in Section B.1 by the percentage of the peacetime cost of the cadre leaders that are assigned to the cadre unit. Assigning different peacetime duties to cadre leaders results in varying relative cost estimates. For instance, a foreign training cadre unit might spend only 25 percent of its time performing cadre duties in peacetime with the rest of its time spent on foreign training missions. Therefore, we assign only 25 percent of the relative cost of the cadre leaders to the cadre unit. We do this by multiplying the relative cost of the cadre unit by the percentage of time the cadre is performing cadre duties. If a cadre unit with all officers and NCOs, which costs 56 percent of an AC unit, was assigned foreign army training duties in peacetime with only 25 percent of its time assigned to the cadre unit, the relative cost of the cadre unit falls to 14 percent (0.25*0.56) of an AC unit. Chapter Three of this paper performs this calculation for various combinations of peacetime structures and duties.

APPENDIX C—SPECIFYING CADRE UNIT STRUCTURE ALTERNATIVES

In Chapter Two, we calculated the number of new officers and NCOs that could fill slots in cadre units if we increased promotion rates or activated the Individual Ready Reserve. This appendix describes the calculations performed to obtain the results in the second chapter. The first section discusses the specification of the Markov Promotion Model and how it is used to calculate the relative cost of a cadre unit relying on increased wartime promotion. The second section discusses the calculations performed to determine the number of officers and NCOs available in the IRR and how this information is used to calculate the relative cost of a cadre unit relying on IRR activation.

C.1—MARKOV PROMOTION MODEL

One of the cadre unit structures examined in Chapter Two required making an assumption about how many senior officers and NCOs could be added during wartime by increasing promotion rates and decreasing promotion intervals. In order to perform this analysis, we created the Markov Promotion Model. This section describes the details of the Markov Promotion model and discusses the calculations performed to derive the results in Chapter Two.

C.1.1—Model Specification

The Markov Promotion Model simulates the effect of different promotion policies on the number of officers and NCOs in a force over time. The model is written using Visual

Basic for Applications (VBA) in Microsoft Excel.[169] Two separate models were built using

the same framework- one for officers and one for NCOs. These models only differ in the

number of states, which is determined by the number of grades. The implementations of

these models are the same. This section describes the implementation of the Markov

Promotion Model.

Inputs

The Markov Promotion Model requires three types of inputs: time definitions,

promotion data, and an initial force structure data. Figure C.1 shows the inputs required for

the Markov Promotion Model for officers.

Figure C.1—Markov Promotion Model Inputs (Officers)

Time		
Periods Per Year	2	
Simulated Periods	4	
Promotion Data		
	Interval	**Rate**
Captain	2	0.98
Major	2	0.98
Lt. Colonel	2	0.89
Colonel	2	0.6
Force Structure	**Initial**	**Results**
New Accessions/Yr	5100	
Lieutenants	18717	
Captains	24192	
Majors	15128	
Lt. Colonels	9489	
Colonels	3957	
Total	*71483*	*0*

There are two types of time definitions required: the resolution and the run time.

Time resolution is specified in terms of periods per year. In all of the models used in this

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[169] The model requires an Excel add-in to perform matrix calculations. The add-in, called Matrix.xla, is available free from the Foxes team at: http://digilander.libero.it/foxes/SoftwareDownload.htm (accessed November 26, 2007).

paper, we specify the resolution to be half-years (two periods per year) because this is the

highest resolution for which the model would provide solutions.[170] We must also specify the

number of periods to simulate. This tells the model to calculate the change in the number of

officers or NCOs after *n* periods. For the analyses in this paper we assumed that *n* is equal to

four periods (twenty-four months) because cadre units that are ready to deploy after 36

months would need to have all officers and NCOs in place with at least 12 months to train

with their new units.

The Markov Promotion Model requires two types of promotion inputs for each

possible promotion: promotion intervals and the promotion rates. The number of inputs

depends on the number of grades, which are different for the officer and enlisted models.

The officer model examines promotions through Colonel (O-6) because we are examining

BCTs, which are led by Colonels. When we conglomerate first and second lieutenants into

one category,[171] the officer model requires specifying data for four promotions (to Captain,

Major, Lt. Colonel, and Colonel). The NCO model requires specifying data for six

promotions (to E-4, E-5, E-6, E-7, E-8, and E-9).[172] In each model, we specify the

promotion interval as the number of time periods between promotions. We determined the

promotion intervals from the Time in Service (TIS) requirements for each promotion as

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[170] Microsoft Excel limits the size of the matrix calculations that can be performed and if we increased the resolution any further than half-years we obtained an infeasible result.

[171] Most of our data combines first and second lieutenants into one category. It is fair to assume that first and second lieutenants are the same because the Defense Officer Personnel Management Act of 1980 dictates that 100 percent of second lieutenants be promoted to first lieutenant if qualified. [CBO (1999), p. 7-8]. The actual promotion rate is close to 100 percent.

[172] In the NCO model, we conglomerate all privates into one category (E-1 through E-3); we assume that all privates are promoted at least through E-3.

specified in Army Regulations.[173] We then specified the promotion rate as the percentage of officers or NCOs promoted to each grade.[174]

The final input required for the Markov Promotion Model is the initial force structure. This requires specifying the number of personnel initially in each grade as well as the number of new accessions in each year. The model uses all of these inputs to calculate the structure of the force after n periods.

Model Calculations

The Markov Promotion Model uses the inputs specified by the user to build a Markov transition matrix (M) and a vector specifying the initial conditions (I). The size of the Markov transition matrix is determined by the number of promotions (four for officers, six for NCOs) and the promotion intervals specified by the user. The size of the transition matrix, which we define as a, is the sum of the promotion intervals for each promotion plus two additional categories, one for the highest rank (Colonel or E-9) and one for separations. If we assume that the interval for each promotion is one year (two periods), then the Markov transition matrix for officers will look as shown in Figure C.2 with ten ($a=4*2+2$) states.[175]

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[173] Department of the Army (2005), Department of the Army (2007c)
[174] In this model, we assume that officers and enlisted personnel are either promoted or separated at each promotion point. In reality, personnel have more than one opportunity to be promoted. However, because we are only interested in the difference in the number of officers and NCOs under different promotion policies, this assumption has minimal impact on the results.
[175] We present a model with ten states for ease of demonstration. In the actual models used to perform the analyses in this paper, models had about 30 states.

Figure C.2—Markov Transition Matrix Example (Officers)

	LT1	LT2	CAP3	CAP4	MAJ5	MAJ6	LTCOL7	LTCOL8	COL9	SEP
LT1	0	1	0	0	0	0	0	0	0	0
LT2	0	0	0.98	0	0	0	0	0	0	0.02
CAP3	0	0	0	1	0	0	0	0	0	0
CAP4	0	0	0	0	0.98	0	0	0	0	0.02
MAJ5	0	0	0	0	0	1	0	0	0	0
MAJ6	0	0	0	0	0	0	0.89	0	0	0.11
LTCOL7	0	0	0	0	0	0	0	1	0	0
LTCOL8	0	0	0	0	0	0	0	0	0.6	0.4
COL9	0	0	0	0	0	0	0	0	1	0
SEP	0	0	0	0	0	0	0	0	0	1

All of the states in the transition matrix are labeled by rank and time in service except for the separated state labeled *SEP*. The transition probabilities are automatically generated by the Markov Transition Model based on the user inputs. The model assumes that within-grade transitions occur with a probability of one, meaning there is no change in the number of losses except through changes in promotion policies. This is a fair assumption to calculate the *difference* in the number of officers and NCOs for different promotion policies as long as the retention rates remain the same under different promotion policies.[176] Under this assumption, the Markov transition matrix contains either 1's or user specified promotion rates in each of the cells directly above the diagonal. For instance, in Figure C.2, all personnel in state LT1 transition to LT2 after one time period. Then, at the Captain promotion point, 98 percent of LT2s transition to CAP3, while the remaining LT2s transition to the separated state (SEP). The transition matrix is specified similarly for all remaining in-grade and promotion transitions up to the final transition. The final grade (Colonel in the officer model, E-9 in the enlisted model) assigns probability of one to the

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[176] Without this assumption, we would need to make an assumption about how retention changes under each of the different promotion policies. For instance, we might hypothesize that an increase in promotion rates would increase retention because soldiers want to stay due to the higher likelihood of reaching retirement. For the model, we would need to estimate the magnitude of this effect at each grade level. This significantly increases the number of parameters that need to be estimated and there is a significant amount of uncertainty in making these estimates. We feel that the simple model, assuming retention is the same, captures the majority of the changes in the structure of the force due to increased promotion policies. While a more complex model would be more complete, we feel that this model is "good enough" for the purpose of estimating the structure of a cadre unit relying on increased wartime promotions.

chance of remaining in the same grade. This assumption is appropriate for calculating the

difference in grade structure under different promotion policies because the extra

Colonels/E-9s that would have transitioned out or up are subtracted out in the base case.

After creating the transition matrix, the Markov Promotion Model creates a vector

with the initial stock of personnel in each state (I). The model takes the initial force structure

by grade entered by the user and spreads it uniformly across the states corresponding to that

grade. For instance, in the previous example with two periods in each grade, the model

would divide the total number of soldiers initially in each grade by two. Since the highest

grade only has one state (Colonel/E-9), the initial stock is equal to the stock specified by the

user. The initial stock of separated personnel is set to zero. For the initial distribution of

officers shown in Figure C.1, the initial state vector is shown in Figure C.3.

Figure C.3—Initial State Vector Example (Officers)

State	Stock
LT1	9358
LT2	9358
CAP3	12096
CAP3	12096
MAJ5	7564
MAJ6	7564
LTCOL7	4744
LTCOL8	4744
COL9	3957
SEP	0

The model uses the initial state vector (I) and the Markov transition matrix (M) to

calculate the distribution of personnel in the force after n time periods in a results vector (R).

First, the model multiplies the Markov transition matrix (M) by itself n times to determine

the relative distribution of personnel after n periods (D_n).

$$D_n = M^n$$

For the analyses in this paper we raised the transition matrix to the fourth power (n=4). The resulting matrix will be of the same size as the initial Markov transition matrix ($a*a$). We then multiply the initial state vector (I) by the new transition matrix, the result of which is a column vector (R) with the distribution of officers or NCOs after n time periods.

$$R_{1*a} = (I_{1*a})*(M_{a*a})^n$$

Model Output

The model aggregates the information in the results vector (R) to output the number of personnel in each grade. Since the Markov model does not allow inflows, the first n slots in the result vector will have zeroes. The model fills there slots using the accessions per year specified by the user. The model divides the accessions per year by the number of periods per year and fills each of the first n slots with this value. The model then sums the number of personnel by grade and outputs the results next to the input data as shown in Figure C.4.

Figure C.4—Output Example (Officers)

Time		
Periods Per Year	2	
Simulated Periods	4	
Promotion Data		
	Interval	Rate
Captain	2	0.98
Major	2	0.98
Lt. Colonel	2	0.89
Colonel	2	0.6
Force Structure	**Initial**	**Results**
New Accessions/Yr	5100	
Lieutenants	18717	10200
Captains	24192	10200
Majors	15128	17975
Lt. Colonels	9489	21100
Colonels	3957	17728
Total	*71483*	*77203*

C.1.2—Calculating Effects of Increasing Promotion Rates

In Chapter Two of this paper, we use the output from the Markov Promotion Model to calculate the number of officers per BCT that could be procured during wartime by increasing promotion rates and/or decreasing promotion intervals. To do this, we first use the Markov Promotion Model to calculate the force distribution after four periods under a base promotion policy (R_1).[177] Then, we calculate the force distribution after n periods under a wartime promotion policy (R_2). We subtract the results of the base policy from the increased policy (R_2-R_1) to determine the increase in officers/NCOs in each grade. However, not all officers/NCOs are assigned to BCTs; many are assigned to non-combat units (Combat Support [CS], Combat Service Support [CSS], or Echelon above Division [EAD]) or to the institutional army (Table of Distribution and Allowances [TDA] units). To calculate the number of extra officers/NCOs that would be available for BCTs, we calculated the ratio of officers/NCOs in BCTs to total officers/NCOs and multiplied the total increase in officers/NCOs by this fraction for each grade.[178] We then calculated the percentage of officers/NCOs that could be procured by increasing promotions by dividing the number of officers available for BCTs in each grade by the number of officers needed for the 6, 9, and 18 BCT expansions and the *CadreMix* force. These results allowed us to determine the size of a peacetime cadre unit that would rely on increased promotion rates to procure officers/NCOs during wartime.

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[177] Chapter Two discusses how we determined the details of the base and wartime promotion policies.
[178] We calculated the number of officers/NCOs in BCTs using the infantry BCT design shown in Appendix A and assuming that there are 42 BCTs with structures similar to an infantry BCT. See Section C.2 for more details on this calculation.

C.1.3—Model Limitations

Promotion of officers/NCOs lends itself well to a Markov process because individuals transition from one period to the next at regular time intervals. The promotion process can be modeled with uniform, fixed time periods and well-defined states that are mutually exclusive and closed. However, there are a few assumptions required to model promotions that may limit the realism of the model. First, the model assumes that soldiers face promotion after set intervals (the minimum time in service requirement) and are either promoted or separated at this point. In reality, soldiers not promoted initially have another chance to be promoted before they are separated. The simple Markov model used here does not capture this reality.[179] Secondly, the model assumes that separations due to lack of promotion are the only way that individuals leave the force. A more realistic model would include retention rates at each transition. However, this would lead to a much more complex transition matrix and would add little value if we assume that retention rates remain the same under different promotion policies as discussed earlier. Lastly, we assume that the probabilities in each row of the transition matrix are fixed over time. In reality, these rates change from year-to-year and would depend on promotion rates from previous years. However, to a first order, the Markov process is an appropriate model to determine the effect of changes in promotion policies on the number of officers/NCOs required in peacetime cadre units.

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[179] A more complex Markov model with more states would be capable of capturing this reality. However, this would require estimating both initial and secondary promotion rates. Because we did not have access to this data, we were unable to model this aspect of the promotion system.

C.2—CALCULATING IRR OFFICER/NCO AVAILABILITY

Another cadre force structure, analyzed in Chapter Two, designed cadre units under the assumption that officers and NCOs would be activated from the Individual Ready Reserve to fill senior positions in cadre units. This section describes how we calculated the number of IRR personnel that would be available in wartime to fill positions in cadre units.

We began the analysis by extracting the number of personnel in the IRR by grade from DoD (2005).[180] This document only breaks down the structure of the IRR by grade for the entire IRR (Army, Air Force, Navy) so we used data on the size of the Army IRR relative to the total IRR to calculate the number of personnel in each grade in the Army IRR.[181] We found that Army personnel comprised 41 percent of the total IRR. Therefore, we multiplied the number of IRR personnel in each grade by 41 percent to obtain the number of Army IRR personnel in each grade. This assumes the grade structure of the Army IRR is the same as that of the IRR as a whole.

Next, we calculated the percentage of personnel in each grade that would be available for BCTs (some personnel would be available only for CS/CSS/EAD units or institutional army assignments [TDA units]). We began by calculating the percentage of personnel in the Army assigned to BCTs in each grade. To do this, we multiplied the number of personnel in each grade for a single BCT by 42 BCTs (the number of BCTs planned for FY2009).[182] Then, we divided the total number of personnel in each grade of the

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[180] DoD (2005), p. 171
[181] DoD (2005), p. 161
[182] Department of the Army (2007b), p. 44

force planned for FY 2009 by the number assigned to BCTs.[183] These calculations and the

resulting percentages are shown in Figure C.5.

Figure C.5—Personnel Available for BCTs by Grade

	Pay Grade	Single IBCT	42 IBCTs	Total Army	% for BCT
OFFICERS	O-1 and O-2	129	5418	18717	29%
	O-3	113	4746	24192	20%
	O-4	36	1512	15128	10%
	O-5	9	378	9489	4%
	O-6	2	84	3957	2%
	CW1 & CW2	23	966	7702	13%
	CW3	5	210	3252	6%
	CW4	2	84	2219	4%
	CW5	0	0	460	0%
ENLISTED	E-1 through E-3	858	36036	115603	31%
	E-4	1124	47208	126172	37%
NCOs	E-5	609	25578	81052	32%
	E-6	343	14406	61870	23%
	E-7	160	6720	39100	17%
	E-8	44	1848	11660	16%
	E-9	12	504	3470	15%

We used the percentage of personnel assigned to BCTs in each grade to determine

the number of personnel in the IRR that would be available for BCTs by multiplying the

percentage for BCTs by the number of IRR personnel who would report for duty in each

grade of the Army IRR.[184] Figure C.6 shows the calculations and final results.

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[183] Department of the Army (2007a)

[184] The percentage of personnel who would report for duty is based upon the 63 percent estimate presented in Korb (2005).

Figure C.6—IRR Calculations

	Pay Grade	Total IRR	Army IRR	Available	% BCT	Available for BCTs
OFFICERS	O-1 and O-2	11,114	4,535	2,857	29%	827
	O-3	19,519	7,964	5,017	20%	984
	O-4	8,716	3,556	2,240	10%	224
	O-5	4,538	1,852	1,166	4%	46
	O-6	1,495	610	384	2%	8
	CW1 & CW2	564	230	145	13%	18
	CW3	380	155	98	6%	6
	CW4	470	192	121	4%	5
	CW5	12	5	3	0%	0
ENLISTED	E-1 through E-3	51,525	21,022	13,244	31%	4128
	E-4	119,861	48,903	30,809	37%	11527
NCOs	E-5	53,311	21,751	13,703	32%	4324
	E-6	5,810	2,370	1,493	23%	348
	E-7	1,559	636	401	17%	69
	E-8	536	219	138	16%	22
	E-9	301	123	77	15%	11

With this information, we were able to calculate the percentage of positions in each grade that would need to be filled by full-time cadre personnel during peacetime for each of the cadre forces examined in this dissertation. To do this, we divided the total number of Army IRR personnel available for BCTs in each grade by the number of cadre personnel needed in each of the cadre forces. These results are shown in Chapter Two of this paper. We then used this data to calculate the cost of a peacetime cadre unit relying on IRR activation using the methodology described in Appendix B.

C.3—CALCULATING COMBINED STRUCTURE

The final cadre structure analyzed in Chapter Two designed a cadre unit that would depend on both a wartime increase in promotions and activation of the IRR. We calculated this structure by first adding the percentage of positions in each grade filled by promoted officers/NCOs to the percentage filled by IRR officers and NCOs for each of the cadre forces. Then, we subtracted this fraction from one to determine the number of officers and NCOs in each grade that must be retained in peacetime. We calculated the relative cost of

this type of cadre unit using the methodology explained in Appendix B. The results are

shown in Chapter Two.

Paper Three—A Historical Analysis of Cadre

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1.   INTRODUCTION

Since its creation, the United States Army has nearly always framed force structure decisions as a tradeoff between active and reserve forces. Active and reserve forces have been referred to in many ways throughout history. In this paper, we refer to active forces as either the Regular Army or the Active Component (AC). We refer to the reserves as either the militia or the Reserve Component (RC).[1] The key differences between active and reserve forces are: (1) reserve forces are part-time while active forces are full-time, (2) reserve forces are less expensive than active forces, and (3) reserve forces have fewer training opportunities than active forces.[2] Active forces train full-time and can be ready to deploy within days or weeks. Reserve forces train part-time and can be ready to deploy within months. The readiness of a force is determined by two main factors: the number of personnel assigned to a unit and the number of training opportunities available. Reserve forces have a lower level of readiness than active forces because they have fewer training opportunities.

Active and reserve forces are two points on a readiness continuum. There are a myriad of alternative forces, at different levels of readiness, which the Army could also choose. Cadre forces are one of these alternatives. Cadre forces have a lower level of readiness than active forces because they retain fewer personnel in peacetime than they would deploy with in wartime. Cadre units retain only leaders during peacetime and are brought to full strength only in wartime. Cadre forces are not new to American military planning. They have been proposed periodically throughout the history of the United States

[1] Prior to the passage of the Dick Act of 1903, reserve forces were called the militia. After 1903, reserve forces were generally referred to as the National Guard. The Reserve Forces Act of 1955 created the Army Reserve. As is common today, we use the term Reserve Component (RC) to refer to both the National Guard and Army Reserve.

[2] See Klerman (2008) for a more detailed discussion of the distinguishing characteristics of reserve forces.

Army as an alternative to active and reserve forces. This paper reviews the history of the cadre idea.

Cadre proposals have emerged for two main reasons. Either there was a change in the perceived readiness of reserve forces or there was a change in the perceived threat. Cadre units have been proposed twice at times when the readiness of the reserves was questioned, three times when there was a significant change in the perceived threat, and once when there was a change in both. This chapter begins by discussing how assumptions about perceived readiness and threat affect force structure decisions. It then outlines instances when either a change in the perceived readiness of the reserves or the perceived threat has served as the impetus for cadre proposals. The following chapters describe these instances in chronological order.

1.1—THE FORCE STRUCTURE PROBLEM

Although many of the assumptions underlying force structure decisions have changed over time, the basic tradeoffs remain the same. Each year, the Army faces a budget constraint. The Army must choose how to allocate funds among a number of competing priorities. For the purposes of this paper, we focus on spending tradeoffs between different types of combat units and ignore other funding priorities such as modernization. For a given budget, there are a myriad of force structures that the Army can choose. The Army must decide which types of forces to maintain, and how many of each type to maintain. These decisions are made based on two important assumptions: (1) the characteristics of the forces that are (or could be) available and (2) the perceived threat.

From an economic point of view, there are two important characteristics of a force to consider when making a force structure decision: cost and readiness. As discussed in the introduction to this dissertation, there is a direct trade-off between these two measures. The Army has traditionally maintained two types of forces: a full-time active army and a part-time reserve. Active forces have a higher level of readiness and higher cost than reserve forces.

Once the Army has specified the set of forces from which to choose, it must make an assumption about the threat scenario. This requires specifying how many and how soon forces would be needed in a war.[3] If the Army expects to have months of warning before it would engage an enemy, as it did during the nineteenth century, then it could depend on a force with a low level of readiness. If the Army expects to engage an enemy with little warning, as it did during the Cold War, then it would want a force with a larger fraction of high readiness units. For the same cost, a high readiness force would have fewer units than a low readiness force. Figure 1.1 depicts the key components of a force structure decision.

Figure 1.1—Force Structure Decision Process
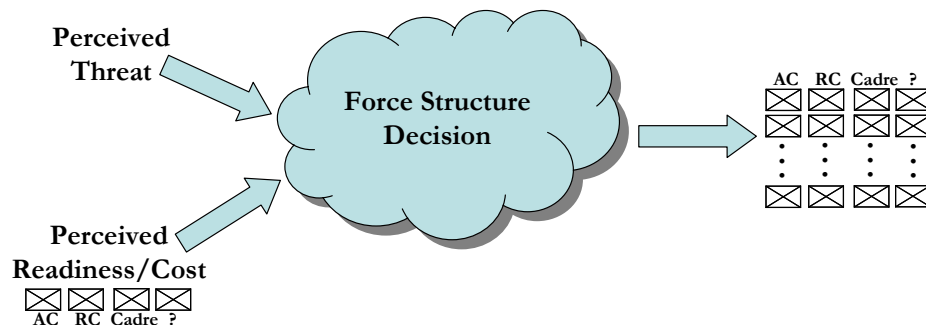
If the Army had perfect knowledge of the readiness/cost of all forces and the threat scenario it will face, force structure decisions would be relatively simple. However, this is never the case. The number of units needed and warning time that would be available in

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[3] See Vick et al (2002) for a discussion of warning time from threats facing the United States.

future wars is subject to great uncertainty. In addition, it is difficult to estimate the readiness

and cost of existing units because of differing assumptions about cost components and the

use of proxy readiness measures. This estimation becomes even more difficult when the

Army considers forces that do not already exist such as cadre forces. Changes in

assumptions about the perceived threat and readiness of the reserves have served as the

impetus for different cadre proposals over time.

1.2—CHANGES IN PERCEIVED READINESS

Cadre forces have been proposed twice during the history of the U.S. Army due to

concerns about the readiness of the reserves.[4] In the early 19th century, two prominent

military figures, John C. Calhoun and Emory Upton, questioned whether relying on the

militia as the nation's primary war fighting force was the most cost-effective alternative.

They argued: (1) that the readiness of the militia was overestimated because they did not

receive adequate training or equipment and (2) that a cadre force[5] would provide more

capability for the same cost. Calhoun and Upton argued that it would cost more to raise the

readiness of the reserves than it would to create a cadre force with the same level of

readiness.[6] They framed their arguments in an either/or fashion, arguing that the United

States should either rely entirely on the militia or eliminate the militia and rely on a cadre

force. There was no discussion of force mix. This either/or presentation was a feature of

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[4] For ease of presentation, the instance when cadre forces were proposed due to both a change in the perceived readiness of the reserves and perceived threat is included in the section on perceived threat.

[5] Calhoun and Upton envisioned cadre units as units that retained all officers and no enlisted personnel during peacetime (there were very few NCOs in nineteenth century Army units) that would be filled out in wartime by a combination of volunteering and conscription. They proposed that cadre units replace *all* militia units.

[6] Neither Calhoun nor Upton explicitly discussed the cost-effectiveness of militia or cadre forces. However, their recommendations and logic imply that each believed that cadre units were more cost-effective. This is discussed in more detail in the following chapters.

nearly all cadre proposals made before World War I. Calhoun and Upton supported their

arguments by recounting the failures of the militia in the nineteenth century. The U.S.

Congress never accepted the cadre proposals of Calhoun and Upton. Instead, Congress

responded to these proposals by providing funding to increase the readiness of the militia.

The second time cadre forces were proposed because of a lack of faith in the

reserves was following the Vietnam War. Due to Lyndon Johnson's refusal to deploy the

reserves to Vietnam, the reserves reputation suffered throughout the 1970s. During this

period, some military professionals proposed that cadre units replace some reserve units.

These proposals were similar to those of Upton and Calhoun; they argued that a cadre force

was more cost-effective than a reserve force. Like those of Calhoun and Upton, these

proposals failed to gain support and disappeared when the total force policy was adopted.

1.3—CHANGES IN PERCEIVED THREAT

There have been four instances when a change in perceived threat has led to force

structure debates that included cadre forces.[7] These changes occurred at the beginning of the

20th century, after World Wars I and II, and at the end of the Cold War. Figure 1.2 shows the

number of army personnel on active duty as a fraction of the population from 1794 through

2007.[8] The intervals over which averages are calculated are based on the timing of significant

changes in perceived threat.

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[7] This section includes the instance when cadre forces were proposed due to both a change in the perceived
readiness of the reserves and the perceived threat (at the beginning of the 20th century).
[8] This graph shows the size of the army (All), the peacetime size of the army (Peacetime), and the peacetime
average over various time periods (Average) relative to the total population of the United States. The size of the
peacetime army was calculated by interpolating the peacetime size of the army during wars as the average of the
size of the army the three years before and after each war. Averages were calculated over four time periods:
1794-1899, 1900-1916, 1917-1939, 1940-1989, and 1990-2007.

Figure 1.2—Historical Size of U.S. Army Relative to Population[9]
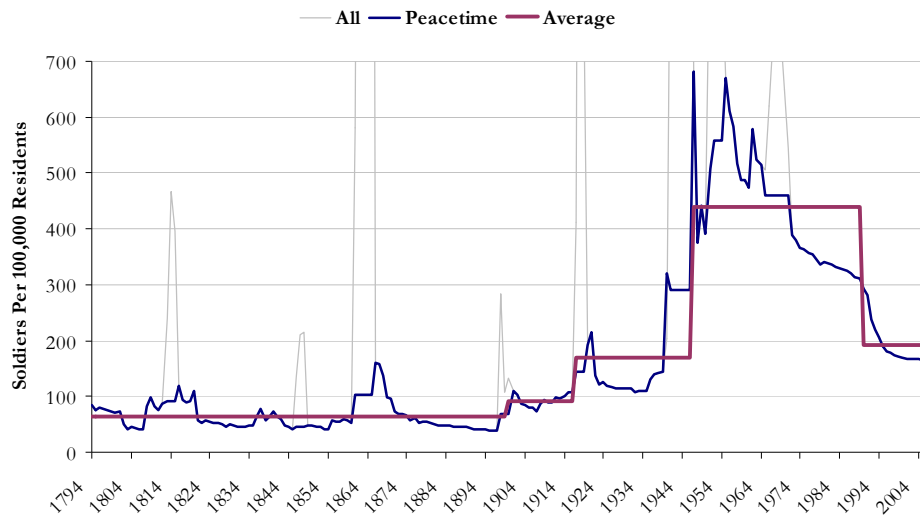
From 1794 through 1900, there was very little variation in the relative size of the peacetime army because the Army's assumption about the threat scenario changed very little. The militia was the primary war fighting force of the United States. Policymakers assumed that the United States would have enough time to train and equip the militia before a war broke out because the U.S. was geographically isolated. Over this time period, the Army averaged 64 soldiers on active duty per 100,000 U.S. residents during peacetime.

The first significant change in perceived threat occurred following the Spanish American War of 1898. This coincided with renewed concern about the readiness of the reserves. After the Spanish American War, the Army began to question the premise of relying on geographic isolation to provide sufficient warning time. Additionally, the experience with the reserves in the Spanish American War brought into question their readiness. This ignited a force structure debate that lasted from 1900 through the beginning of World War I. Cadre forces were proposed many times throughout this period. These

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[9] Data extracted from: U.S. Census Bureau (1975), U.S. Census Bureau (2002), U.S. Census Bureau (2003), and DMDC (2008). See Appendix A for more detail.

proposals failed to gain support and the Army responded to the change in perceived threat by increasing the size of the active army. Between 1900 and 1916, the average number of soldiers on active duty per 100,000 residents during peacetime was 92, about 50 percent larger than the size of the peacetime Army during the nineteenth century.

The second major change in perceived threat occurred following World War I. Based on its experiences in the First World War, the Army perceived a larger and more imminent threat in the period following the war. In response to this new threat, the Army both increased the number of active duty soldiers and created a cadre force. Between 1917 and 1946, the average number of soldiers on active duty during peacetime per 100,000 residents rose to 170, nearly double the size of the force before World War I. A cadre force, the Organized Reserves, was also created following the First World War. The Organized Reserves were initially envisioned as a non-drilling force of fully manned units. However, a lack of funding led to units that retained officers but no enlisted personnel. The Organized Reserves existed as a cadre force until 1955 when it became part of the Army Reserve. The Organized Reserves were the first and only cadre force that existed during peacetime in the United States.

The third significant change in perceived threat occurred after World War II. Following the Second World War, there remained two world superpowers: the United States and the Soviet Union. The U.S. Army perceived the Soviet Union as both a larger and more imminent threat than any it had faced before. The Army expected to deploy all forces to Europe quickly in the event of a Soviet invasion. Many believed that the war would be won or lost in the first few months. Cadre units were no longer useful because they would take *years* to deploy. The Army focused on building a large force that could deploy within *months*

of mobilization. The size of the active army continued to grow. Between 1947 and 1989, the average number of soldiers per 100,000 residents was 440, more than twice as large as it had been prior to World War II. Cadre forces were not frequently discussed during this time due to the lengthy amount of time they would require to deploy.

The final major change in perceived threat occurred following the end of the Cold War. The Army felt that the fall of the Soviet Union created a smaller and less imminent threat to the United States. After the end of the Cold War, the size of the active army decreased significantly. Between 1990 and 2007, the average number of soldiers per 100,000 residents fell to 193, about half the average peacetime size of the Army during the previous fifty years. During the drawdown, cadre units were proposed as a way to hedge against the possibility of a resurgent Soviet Union. This would allow the Army to maintain personnel and equipment that otherwise would be eliminated in case the Soviet Union began rearming. These cadre proposals were given serious consideration by the Army but never implemented. This marked the last time that anyone seriously discussed cadre units.

1.4—OUTLINE

This paper provides a detailed account of the cadre proposals discussed in this introduction. The purpose of this historical review is to provide a context for the cadre forces analyzed in this dissertation. The chapters of this paper are organized in chronological order. Chapter Two introduces the cadre proposals of Calhoun and Upton from the nineteenth century. Chapter Three discusses the cadre debate in the early twentieth century and Congressional action to strengthen the militia. Chapters Four and Six examine the Army's experience with cadre units in World Wars I and II. The fifth chapter discusses cadre

forces during the interwar period. Chapter Seven explains how cadre proposals disappeared in the mid-twentieth century but that some unplanned cadre forces still existed. The eighth chapter discusses cadre proposals that emerged after the Vietnam War in response to doubts about the readiness of the reserves. Chapter Nine discusses the reemergence of cadre proposals during the Cold War drawdown. Lastly, Chapter Ten compares the cadre proposals made throughout the history of the U.S. Army with the cadre forces analyzed in the first two papers of this dissertation.

2. CADRE VERSUS MILITIA

Cadre units were first proposed in the United States due to a perceived lack of readiness of the militia. In the nineteenth century, the militia was the primary war fighting force of the United States.[10] Based on the country's negative experiences with the militia during this time, two prominent military professionals, John C. Calhoun and Emory Upton, proposed that the militia be replaced with a cadre force.[11] These individuals believed that it was more cost-effective to pay some full-time officers who could hone their skills during peacetime rather than pay for a part-time militia, which would have only limited training opportunities. This contradicted the beliefs of many early U.S. leaders who were suspicious of a professional military and thought it was better to rely on the militia because this would reduce the chance of the army becoming "an instrument of despotism" as they experienced in England.[12] Despite this support, early wartime experiences with the militia led many to question its readiness.

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[10] The Regular Army (equivalent to today's AC) was technically the nation's primary fighting force but was too small to meet the demands of anything but small skirmishes with Indians. For wars, the militia was the primary source of manpower.

[11] In the nineteenth century, a cadre unit was defined as a unit that was assigned only officers during peacetime. Theses officers would be retained on active duty (full-time). Nineteenth century army units had very few non-commissioned officers (NCOs) so there was little discussion of cadre units retaining *any* enlisted personnel during peacetime. A militia unit was defined as a unit that was assigned a full complement of officers and enlisted personnel in peacetime. Both the officers and enlisted personnel in a militia unit were retained in drilling status (part-time) during peacetime.

[12] Stewart (2005a), p. 108. In 1784, the Continental Congress emphasized this point: "standing armies in time of peace are inconsistent with the principles of republican governments, dangerous to the liberties of a free people, and generally converted into destructive engines for establishing despotism." [Kreidberg and Henry (1955), p. 3]. This distrust of standing armies was not unique to the United States, it existed in England as far back as 1620. [Shwoerer (1974)]

2.1—THE FAILURES OF THE MILITA

In order to understand the circumstances under which cadre forces were first proposed, we must understand the plight of the militia in the late eighteenth and early nineteenth century. Doubts about the readiness of the militia that emerged from wars during the eighteenth and nineteenth centuries served as the main argument for cadre forces.

Noted historian Russell Weigley argues that before the Revolutionary War, the state militias were effective only at fighting small wars against Indians or equivalent citizen-soldiers such as the French-Canadian militia.[13] The first evidence that the state militias were not reliable in larger wars came in the French and Indian War (1754-1763). In this war, many colonies were unsuccessful in mobilizing the militia to support the British.[14] Weigley argues that the lesson drawn from the French and Indian war was that: "the militia system had shown it could be useful when the citizenry felt involved in a military crisis. It was not a fit instrument for prolonged warfare on distant frontiers."[15] No attempt was made to build a more effective force because Britain could simply send over their regular army forces to defend the colonies in larger wars. The Revolutionary War was the first time the militia would be America's primary fighting force.

2.1.1—The Revolutionary War

The Revolutionary War was the first time that the "American" militias were tested. On June 14, 1775, the Continental Congress authorized the mobilization of troops under its

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[13] Weigley (1984), p. 9

[14] This was partially due to the fact that the militia could not be used outside of the colony without legislative permission [Kriedberg and Henry (1955), p. 7]. However, the British circumvented these laws by recruiting militia members into newly formed volunteer units. Even so, it was still difficult for the British to find recruits. [Weigley (1984), p. 14-15]

[15] Weigley (1984), p. 16

sponsorship for the first time. At that time, there were about 15,000 colonists ready to fight

in Boston.[16] Because most people expected that the armed uprising would force Britain to

settle the grievances, the colonists were only enlisted through December of 1775.[17] Due to

these short enlistments, when the conflict dragged on into December, "(George)

Washington had to disband one army and create another in the presence of the enemy."[18]

This was the first of many times that General George Washington was forced to replace part

of his army in the midst of combat due to short enlistments.[19] These experiences frustrated

Washington who wrote that only a professional, regular army[20] would serve the wartime

needs of the United States. Washington wrote, "regular troops alone are equal to the

exigencies of modern war, as well for defence as for offence … *No militia* will ever acquire

the habits necessary to resist a regular force."[21] Cadre proponents would emphasize

Washington's frustration with the militia in the nineteenth century.[22] However, critics of

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[16] Millis (1956), p. 29

[17] Weigley (1984), p. 34. Government officials understood that longer enlistments were preferred but did not think that they could be practically achieved. "John Adams estimated that in Massachusetts not over a regiment '… of the meanest, idlest, most intemperate and worthless …' would have enlisted for the duration." [Kreidberg and Henry (1955)] Short enlistments were also a way to minimize costs. Since armies generally rested in the wintertime in the Revolutionary War (except for the battle of Trenton), the government could minimize costs by enlisting men for the spring through fall and not incur the cost of maintaining forces over the winter when they provided no fighting capability. [Palmer (1941)]

[18] Weigley (1984), p. 34

[19] At the end of 1776 when the enlistments of soldiers who enlisted at the end of 1775: "General Washington was once more compelled to discharge one army and rebuild another in face of the enemy." [Millis (1956), p. 31]

[20] The Regular Army is the equivalent of today's AC force; it does not include the militia (now the National Guard).

[21] Weigley (1984), p. 74

[22] In the *Military Policy of the United States*, Emory Upton's twelfth lesson from the Revolutionary War was "that Regular troops engaged for the war, are the only safe reliance of a government, and are in every point of view the best and most economical." [Upton (1904), p. 67] Upton quoted Washington extensively in arguing against the militia. A famous Washington quote used by Upton spoke of the militia: "They come in … you cannot tell how; go, you cannot tell when; and act, you cannot tell where; consume your provisions, exhaust your stores and leave you at last at a critical moment." [Ambrose (1964), p. 125]

cadre forces would later find evidence, overlooked by early cadre proponents,[23] that even though Washington was frustrated with the militia, when he proposed a peacetime army structure he "favored a well-organized militia, not a standing army of any size."[24] Washington's support for a peacetime militia was the impetus for the first legislation regarding the militia in the United States.[25]

2.1.2—The Militia Act of 1792

In May of 1792, Congress passed the first major legislation regarding the militia in the United States. This act asserted the U.S. government's reliance on the militia as the nation's primary war fighting force. For the first time in the history of the United States, the act set standards for the organization of the militia and called for the enrollment of every able-bodied white male citizen between eighteen and forty-five[26] while requiring each man to provide his own arms.[27] Many military professionals and historians felt this act failed to address many of the problems with the militia.[28] First, the Militia Act limited mobilization of the militia to three months. The Act stated: "no officer, non-commissioned officer or private

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[23] An outspoken cadre critic, John McAuley Palmer, wrote *America in Arms* in 1941 in which he argues that it was a national tragedy that Emory Upton overlooked evidence of Washington's writings on the proper peacetime organization for the army. Palmer wrote that: "General Upton based his conclusions upon Washington's published writings as contained in the Sparks collection. Though he made two quotations from Volume VIII of Sparks, he overlooked the footnote in that volume where the editor refers to his omission of the treatise on military policy that Washington wrote at Newburgh in 1783. This was a great misfortune for General Upton and tragic for his country." [Palmer (1941), p. 103]

[24] Ambrose (1964), p. 125.

[25] Washington made his recommendations in "Sentiments on a Peace Establishment," which called for a small regular army detailed to Indian defense behind which "would stand a militia system enrolling all male citizens between eighteen and fifty and holding them liable for service to the nation in emergencies." [Weigley (1984), p. 80]

[26] This was the first time the U.S. government asserted that all citizens had an obligation to serve in the military.

[27] Weigley (1984), p. 93

[28] Emory Upton is the most famous critic of the Militia Act but this law also receives criticism in: Kreidberg and Henry (1955), p. 31; and Millis (1956), p. 52. John McAuley Palmer says of the Act: "Its passage actually made our military system worse than it was before the bill was introduced." [Palmer (1941), p. 50]

of the militia shall be compelled to serve more than three months in any one year, nor more than in due rotation with every other able-bodied man of the same rank in the battalion to which he belongs."[29] This perpetuated one of the major problems with the militia experienced during the Revolutionary War. Because the militia needed time after mobilization to train before they could be ready to fight, short enlistments often meant that by the time the militia were trained to fight, their enlistments were complete and they would return home.

A second drawback of the Militia Act was that it allowed the states to appoint officers. In his proposal for a cadre force Emory Upton emphasized this as a major failure of the militia system. In his analysis of the Militia Act of 1792, he wrote: "A mere glance at the military edifice proposed by this law shows that its foundations were built on the sands … It is not necessary to discuss the military qualifications of the swarm of generals appointed by the different states … although it was upon these that the General Government would have to depend in case of actual war."[30] The major drawback of allowing states to appoint officers was discipline. States generally allowed units to elect their officers. In order to win a popular vote of their men, militia officers were often lax with discipline.

The final criticism of the Militia Act was that it left the enforcement of the law up to the states. There was no penalty for a state not enrolling all able-bodied men, nor was there a penalty for men not providing their own arms. Kreidberg and Henry best express this: "the lack of teeth in the act and failure to provide Federal standardization and supervision for it doomed it to impotence."[31] The Militia Act would serve as the primary law regulating the

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[29] United States Congress (1792)
[30] Upton (1904), p. 85
[31] Kreidberg and Henry (1955), p. 31

militia until passage of the Dick Act in 1903.[32] Because the Militia Act perpetuated many of

the systemic problems with the militia, they would remain issues in the wars of the

nineteenth century.

2.1.3—The War of 1812

> "By now it was evident that the militia could contribute little in a sudden emergency.
> The states had neglected to train and make ready the battalions and divisions
> enrolled under the act of 1792, and a Congressional enactment of 1803 requiring
> them to make periodic reports on the condition of their militias failed to prod them
> enough. So Jefferson recommended, and on April 12, 1808, Congress authorized, a
> virtual tripling of the Regular establishment, to nearly 10,000 men."[33]

In 1808, with the threat of war with England increasing, President Thomas Jefferson

decided that a larger Regular Army was necessary to defend the United States. Weigley

argues that Jefferson took this action because he believed the militia would not be ready in a

sudden emergency.[34] However, when the war began in 1812, the size of the army was

significantly smaller than authorized, with only 6,744 men.[35] The demands of the War of

1812 required once again calling on the militia. This brought two issues to the forefront.

First, it led to a debate about whether states had the right to ignore requests from the federal

government to furnish troops. Second, the war highlighted the problem of using the militia

outside of the United States. Cadre proponents later emphasized both of these issues.

On April 10, 1812, the states of Massachusetts and Connecticut were called upon to

furnish 100,000 militiamen. The governors of these two states refused to provide troops

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[32] See Chapter Three of this paper for further discussion of the Dick Act.

[33] Weigley (1984), p. 109. See footnote below for the relative size of the military at this time.

[34] Weigley (1984), p. 109

[35] Millis (1956), p. 67. 6,744 troops was equivalent to 87 troops on active duty per 100,000 residents,
significantly higher than the average peacetime size of the army over during the nineteenth century (64 troops
per 100,000 residents). However, this was significantly less than the 10,000 troops (130 troops per 100,000
residents) Jefferson had asked for in 1808. During the war of 1812, the number of personnel on active duty
grew as large as 38,186 in 1814 (466 troops per 100,000 residents). [U.S. Census Bureau (1975), p. 1140-1143
and U.S. Census Bureau (2002), p. A-1]

because they had decided that none of the three exigencies described in the Constitution for

calling out the militia existed.[36] The Constitution stipulated that Congress could "provide for

calling forth the militia to execute the laws of the union, suppress insurrections, and repel

invasions."[37] The governors claimed that because the Constitution did not specify who

determines whether the exigencies exist that this power "is vested in the commanders in

chief of the militia of the several States."[38] By relying on the states to voluntarily provide

manpower, the militia laws restricted the actions of the federal government in fighting the

war of 1812. Cadre proponents who desired a more centralized system would emphasize this

concern.

The second issue brought to the forefront in the war of 1812 was the inability to use

the militia outside of the United States. Many men in the militia refused to fight in

campaigns that moved into Canada because they felt they were not obliged to serve outside

of the United States.[39] This occurred because the Constitution provided little guidance

regarding the use of the militia outside of the United States. The militiamen argued: "troops

could be summoned only to 'repel invasion, not to invade another territory.'[40] Millis (1954)

argues that: "many of the western militiamen were happy, as they approached the border, to

discover in the Constitution a sound legal reason why they should avoid the perils and ardors

of going any farther."[41] The inability to use the militia outside of the United States was a key

argument for cadre proponents. Since cadre units would be controlled by the federal

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[36] Upton (1904), p. 96. In addition, the governor of Vermont refused to provide troops except to defend Vermont from attack. [Wood(1916), p. 132]

[37] U.S. Constitution, Article I, Section 8, Clause 15.

[38] Upton (1904), p. 96

[39] Upton (1904), p. 99

[40] Millis (1956), p. 69

[41] Millis (1956), p. 69

government, they could be sent anywhere in the world. This became more important as the

War of 1812 was the first of many engagements in which troops would be deployed outside

of the United States.

Both of the problems with the militia encountered in the war of 1812 would weigh

heavily on the minds of John C. Calhoun and Emory Upton when recommending an

appropriate peacetime structure for the army. However, it is worth noting that these

problems do not relate directly to the readiness of the militia themselves but to the militia

system. Weigley concludes: "the War of 1812 demonstrated no clear superiority of Regular

Army formations over those based upon volunteer militia."[42] However, the restrictions on

the ability to use the militia were as important as the readiness of the force. A lack of

adequate troops has the same harmful effect as a larger force with degraded capability. The

problems brought to the forefront by the War of 1812 would remain key drawbacks to any

military policy depending on the militia as the nation's primary war fighting force.

2.1.4—Problems with the Militia

We have reviewed the problems with the militia that spurred Calhoun and Upton to

propose cadres force to replace the militia. They argued that the militia could not be

depended upon due to:

- Short enlistments
- Unqualified Officers (state appointment of officers)
- Lack of training and equipment (training supervised by states, equipment provided by individual militiamen)
- Dependence upon state governors to furnish troops

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[42] Weigley, p. 131. Weigley refers to historians who try to argue that the War of 1812 demonstrates the superiority of the Regular Army as: "Uptonian historians," biased by the arguments for a professional force made by Emory Upton.

- Inability to use the militia outside of the United States

All of the above are systemic problems and do not bring into question the effectiveness of individual militiamen. This distinction is important because many would later interpret the arguments of cadre proponents to be personal attacks on the militia.

2.2—CALHOUN'S EXPANSIBLE ARMY

> "At the commencement of hostilities, there should be nothing either to new model or to create. The only difference, consequently, between the peace and the war formation of the army, ought to be in the increased magnitude of the latter; and the only change in passing from the former to the latter, should consist in give to it the augmentation which will then be necessary."
>
> - Secretary of War John C. Calhoun, 1820[43]

Secretary of War John C. Calhoun first introduced the idea of a cadre force to U.S. military policy in 1820. On May 11, 1820, Calhoun was directed by Congress to prepare a plan to reduce the size of the Regular Army from 12,000 to 6,000 personnel.[44] Weigley argues that there were two reasons for this request: (1) Congress was frustrated with General Andrew Jackson's excursions into Spanish Florida and wanted to restrain military adventurism, and (2) some Congressmen wanted to "depreciate the Presidential stock of both General Jackson and War Secretary Calhoun."[45] Millis argues that military professionals opposed this reduction because the "Seminole War rather clearly indicated that a regular Army of even 10,000 men was too small for the normal requirements of Indian warfare and

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[43] Calhoun (1820), p. 5

[44] Weigley (1984), p. 140. In relative terms, this was a reduction from 125 troops on active duty per 100,000 residents to 62 troops per 100,000 residents (close to the average relative peacetime size of the army during the 19th century of 64 troops per 100,000 residents). [U.S. Census Bureau (1975), p. 1140-1143 and U.S. Census Bureau (2002), p. A-1]

[45] Weigley (1984), p. 140

border police."[46] To balance the requests of both Congress and military professions, Calhoun proposed an 'expansible' Army.[47] Calhoun's plan called for "reducing the rank and file, without a correspondent reduction of the battalions and regiments."[48] Calhoun proposed cutting enlisted strength in half while retaining all officers as shown in Figure 2.1.[49]

Figure 2.1—Calhoun's Expansible Army Proposal[50]

Pre-1820

Infantry: 9 × Regiments

Officers	1 Reg.	Total
Colonels	1	9
Lt. Colonels	1	9
Majors	1	9
Captains	10	90
Lieutenants	10	90
2nd Lieutenants	10	90
Total	33	297
Enlisted (Privates)	1 Reg.	Total
Sergeant Majors	1	9
Quartermaster Sergeant	1	9
Sergeants	40	360
Corporals	40	360
Privates	680	6120
Musicians	22	198
Armor & Workmen	1	9
Total	785	7065
Total (Officer+Enlisted)	818	7362

Artillery: 42 × Companies

	Total
Officers	275
Enlisted	4971
Total	5246

Total Army = 12,608

Calhoun Proposal

Infantry: 9 × Regiments

Officers	1 Reg.	Total
Colonels	1	9
Lt. Colonels	1	9
Majors	1	9
Captains	10	90
Lieutenants	10	90
2nd Lieutenants	10	90
Total	33	297
Enlisted (Privates)	1 Reg.	Total
Sergeant Majors	0	0
Quartermaster Sergeant	0	0
Sergeants	40	360
Corporals	40	360
Privates	280	2520
Musicians	10	90
Armor & Workmen	4	36
Total	374	3366
Total (Officer+Enlisted)	407	3663

Artillery: 42 × Companies

	Total
Officers	247
Enlisted	3025
Total	3272

Total Army = 6,935

Calhoun proposed reducing the number of enlisted personnel in an infantry regiment from 7,065 to 3,366 (a reduction of 52 percent) while retaining all 297 infantry officers. His proposal also cut the number of enlisted personnel in artillery companies from 4,971 to 3,025 (a reduction of 39 percent) while slightly reducing the number of artillery officers from 275 to 247 (ten percent). Overall, Calhoun's proposal maintained force structure and

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[46] Millis (1956), p. 82

[47] Calhoun's *Report of the Secretary of War of a Plan for the Reduction of the Army of the United States* does not explicitly use the word "expansible" but many historical references to this plan use this term due to the use of this term by Emory Upton in *The Armies of Asia and Europe*. For the purposes of this paper expansible is synonymous with cadre.

[48] Calhoun (1820), p. 9

[49] See Appendix B for a more detailed breakout of Calhoun's proposal.

[50] Calhoun (1820), Table E

leadership while cutting the enlisted strength in half. Calhoun argued that volunteers could

be recruited to fill out the "cadre" units in time of war.[51]

Calhoun claimed his plan would "enable the government, at the commencement of

hostilities, to obtain a regular force, adequate to the emergencies of the country, properly

organized and prepared for actual service."[52] This plan was based on the premise that the

existing state militias were not an effective fighting force as Calhoun explained:

> "I am aware that the militia is considered, and in many respects justly, as the great national force; but to render them effective, every experienced officer must acknowledge, that they require the aid of regular troops … they may be safely relied on to garrison our forts, and to act in the field as light troops … to rely upon them beyond this, to suppose our militia capable of meeting in the open field the regular troops of Europe, would be to resist the most obvious truth, and the whole of our experience as a nation."
>
> -   Secretary of War John C. Calhoun, 1820[53]

Congress rejected Calhoun's proposal. Instead, Congress reduced the size of the

Army to 6,000 men with proportional cuts made in both officer and enlisted personnel.[54]

Weigley argues that Congress opposed Calhoun's plan mainly due to its relation to the "new

awakening of nationalism" which "emphasized the distinction between citizen and soldier."[55]

Congress remained skeptical of professional armies based on experiences in England.

Additionally, the militia had significant lobbying power in Congress because they were well

organized, distributed in all Congressional districts, and tied into the local political system.[56]

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[51] Millis describes Calhoun's plan: "Volunteers would largely supply the increments; the national officer cadre would largely exist; the discipline and training of the regulars would stiffen the recruits and soon be imparted to them." [Millis (1956), p. 83]

[52] Calhoun (1820), p. 4

[53] Calhoun (1820), p. 4

[54] Weigley (1984), p. 142

[55] Weigley (1984), p. 142

[56] The National Guard continues to have a strong congressional lobby. In 2008, the National Guard continues to be well organized and distributed among Congressional districts though they are less tied into local politics. Great care should be taken to consider the National Guard's reaction to any cadre proposal since these proposals have historically attacked its effectiveness.

Even though Calhoun's plan was rejected, cadre proposals spurred by a lack of faith in the militia did not disappear. The next major cadre proponent was Civil War veteran Emory Upton.

2.3—UPTON'S CADRE ARMY

Emory Upton is considered the founder of the cadre army. Although he was not the first to think of the idea, he was the first to make a strong argument for its place in United States military policy. Upton's cadre proposal had enormous influence on future military policy and it was the subject of debate for many years.

2.3.1—Upton's Civil War Experiences

Upton graduated from the Military Academy at West Point in June 1861 and immediately entered the Civil War. Upton emerged from the Civil War as a successful young officer achieving the rank of brevet major general.[57] Upton's experiences in the Civil War were his first indication that it might be unwise to depend on the militia. After the war, Upton wrote that "the army of which he was a part 'presented to the world the spectacle of a great nation nearly destitute of military force"'.[58] Upton went on to say that "the militia was 'so destitute … of instruction and training that … they did not merit the name of a military force."[59] Upton's most famous claim was that "20,000 *regular* troops at Bull Run would have routed the insurgents, settled the question of military resistance and relieved us from the pain and expense of four years of war."[60] In his biography of Upton, Stephen Ambrose argues that many of these views were biased by Upton's strong allegiance to a professional

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[57] Weigley (1984), p. 275
[58] Ambrose (1964), p.17
[59] Ambrose (1964), p. 17
[60] Millis (1956), p. 117, emphasis added.

military and his personal ambitions.[61] However biased his views, Upton's observations from

the war were real and shared by other historians.[62] Ambrose wrote that after the Civil War,

Upton "could never forget what he had seen in the Civil War—volunteers refusing to fight

because their contracts had been violated; professional soldiers pushed aside for political

favorites; state governors withholding promotions from deserving men; incompetents, both

professional and amateurs, in command of army corps; militiamen running from the banks

of Bull Run. The Civil War, the great experience in his life, taught Upton that the military

policy of the United States needed improvement."[63] Upton would find his solution to these

problems on a tour of the world's armies.

2.3.2—Lessons from *The Armies of Asia and Europe*

On June 23, 1875, Emory Upton received orders to "travel through Asia and

Europe, reporting on all the armies he observed."[64] When he returned in 1878, Upton

published his observations in *The Armies of Asia and Europe*.[65] The majority of his report

focused on describing foreign armies. However, Upton used the final fifty pages to provide

his recommendations for the structure of the United States Army. Upton begins his report

by saying "until we change our present inexpansive organization, which, with few

modifications comes down to us from the Revolution, and devote more attention to military

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[61] Speaking of Upton, Ambrose wrote: "Nearly every one of his reforms, if adopted, would have an immediate beneficial effect upon him … But, as he had done before and would again, Upton convinced himself that his motives were for the good of the army." [Ambrose (1964), p. 105]

[62] Weigley writes: "Citizen soldiers as usual were loath to pay unquestioning obedience to officers who had recently been their neighbors and whose advantages in soldierly knowledge were at best something culled from a book." [Weigley (1984), p. 231] In summarizing the lessons from the Civil War Kreidberg and Henry write: "The Militia as organized could not provide a reservoir of military manpower…. The officers and enlisted men of the Regular Army … must be used as the cadre for the wartime Army." [Kreidberg and Henry (1955), p. 139]

[63] Ambrose (1964), p. 52

[64] Ambrose (1964), p. 87

[65] Upton (1878)

education, the details of arms and equipment in foreign armies merit little, if any, of our attention."[66] Upton proposed two plans that he claimed "either of which, if matured in time of peace, and adhered to in time of war, will enable us to prosecute our future campaigns with economy and dispatch."[67] The first plan was to "organize, localize, and nationalize the regular army that, by the mere process of filling its cadres, it may be expanded to such proportions as to enable it, without other aid, to bring our wars to a speedy conclusion."[68] This proposal was based on the German system. Weigley writes: "Upton's observation of the German army of 1876, fresh from its triumphs over Austria and France, led to an infatuation with it and to a decision to advocate the adoption of a similar military system by the United States."[69]

The German army of the nineteenth century relied on an organized reserve controlled by the national government and recruited at the local level.[70] The purpose of this reserve was to bring cadre units to full strength during wartime. Cadre units were the core of the German military system; there were no fully manned active duty units. All German active units were maintained in cadre status during peacetime as shown in Figure 2.2.

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[66] Upton (1878), p. ix

[67] Upton (1878), p. 323

[68] Upton (1878), p. 323

[69] Weigley (1984), p. 276. Upton was not the only one with the desire to adopt the Germany system. Ambrose writes: "Greeks, Rumanians, Turks and others … trekked to Berlin to study." [Ambrose (1964), p. 94]

[70] Upton (1878), p. 195-197

Figure 2.2—Germany Cadre Battalion (1878)[71]

Rank	Peace-footing Officers	Peace-footing Men	War-footing Officers	War-footing Men
Command				
Batallion Commander	1		1	
Adjutant	1		1	
Non-commissioned Officers		2		1
Drum-major		1		1
Staff-surgeon			1	
Assistant-surgeon			1	
Paymaster	1		1	
Paymaster-assistant	1		1	
Armorer		1		1
Hospital attendants		2		4
Tradesmen		4		
Train-soldiers				20
Four Companies				
Captains	4		4	
First-lieutenants	4		4	
Second-lieutenants	8		12	
Sergeant-majors		4		4
Fahnriche		4		4
Vice-sergeant-majors		4		4
Sergeants		16		16
Corporals		28		52
Lance-corporals		52		96
Drummers		8		12
Buglers		8		12
Privates		423		796
Total	**20**	**567**	**26**	**1023**

While German active units retained nearly all officers during peacetime, they retained only 55 percent of enlisted personnel. They utilized peacetime conscription to ensure that there would be a large enough reserve to fill out the cadre units in wartime. In nineteenth century Germany, all able men were required to serve in the military for twelve years: three on active duty, four in a reserve, and five in the Landwehr.[72] The difference between the reserve and the Landwehr was that a man was expected to spend more time drilling in the reserve than he was in the Landwehr.[73] Unlike the reserve system in the United States,

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[71] Upton (1878), p. 193

[72] Upton (1878), p. 197

[73] During the four years a man spent in the reserve, he was expected to attend a muster twice a year and attend maneuvers not exceeding eight weeks no more than twice. During the five years a man spent in the Landwehr, he could be called upon no more than twice for drills not to exceed fourteen days at a time. [Upton (1878), p. 198, 201]

reservists were not organized into units. They were simply a pool of manpower that could be drawn upon to fill out cadre units during wartime.

Upton admired the German cadre system based not only on its focus on a professional army but also on its practical successes.[74] Upton wrote: "when Germany fought France she put her army on a war-footing in eight days, and in eight days more she had four hundred thousand men on French territory. It took us from April, 1861, to March, 1862, to form an army of the same size."[75] These successes led Upton to propose a military system similar to Germany as his first alternative. In his writings, Upton avoided discussing how cadre units in the United States would be filled out in wartime. He never mentioned conscription, the basis of the German cadre system. Weigley argues that Upton "dared approach that topic [conscription] only obliquely, by arguing that history proved the necessity for conscription in wartime."[76] Ambrose also argues that "he [Upton] dared not go too far in copying the Europeans. He never advocated peacetime conscription … and his 'National Volunteers' did not constitute a true reserve, they were merely men who would volunteer to serve under regular army personnel in an emergency."[77] By avoiding the topic, Upton failed to justify his belief that an adapted German cadre force was the best military system for the United States.

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[74] Weigley argues that Upton was especially receptive to the German cadre army due to his personality: "Upton was temperamentally receptive to the German system: he was intense, humorless, single-mindedly devoted to the military profession and to efficiency in it, a sober, even brooding, man sustained by an old-fashioned Protestant piety- in short, a man not unlike several of the German military reformers themselves." [Weigley (1984), p. 276]

[75] Michie (1885), p. 386-387

[76] Weigley (1984), p. 279

[77] Ambrose (1964), p. 102. However, Upton did eventually ask "for a declaration that every able-bodied male citizen owed military service … This came close to advocating universal conscription, which Upton had previously said he did not want, but which in fact he admired but never dared advocate." [Ambrose (1964), p. 102]

Upton's second plan was to "prosecute future wars with volunteer infantry, supported by the regular artillery and cavalry, apportioning the officers of the regular army among the volunteers in such a manner that" all units "shall be trained and commanded by officers of military education and experience."[78] Upton believed that professional officers could easily train raw infantry soldiers while artillery and cavalry soldiers should be training full-time to master their more difficult crafts.

Upton's plan for a cadre army was very similar to that of John C. Calhoun and Upton credited Calhoun in his writings.[79] Upton proposed an army of twenty-five infantry regiments, ten cavalry regiments, and five artillery regiments. These regiments would be staffed primarily with officers and non-commissioned officers (NCOs) during peacetime. The regiments would then expand in wartime by increasing the number of enlisted men and battalions. Figure 2.3 shows Upton's recommendation for the composition of a two-battalion infantry regiment in both peacetime and wartime.

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[78] Upton (1878), p. 323
[79] Weigley (1984), p. 277

Figure 2.3—Upton's Expansible Infantry Regiment[80]

Peacetime Infantry Regiment (2 Battalions)

Officers	
Colonels	1
Lt. Colonels	1
Majors	1
Captains	8
Lieutenants	8
2nd Lieutenants	8
Total	*27*
Enlisted (Privates)	
First-sergeant	8
Sergeants	32
Corporals	32
Musicians	16
Artificers	16
Wagoner	8
Privates	**320**
Total	*432*

Total (Officers + Enlisted) = 459

Wartime Infantry Regiment (2 Battalions)

Officers	
Colonels	1
Lt. Colonels	1
Majors	1
Captains	8
Lieutenants	16
2nd Lieutenants	16
Total	*43*
Enlisted (Privates)	
First-sergeant	8
Sergeants	96
Corporals	192
Musicians	16
Artificers	16
Wagoner	8
Privates	**1600**
Total	*1936*

Total (Officers + Enlisted) = 1,979

Upton's proposal differs slightly from Calhoun's in that some officers and NCOs would also be added during wartime. Upton's two-battalion regiment had 27 officers and 432 enlisted men in peacetime. In wartime, this regiment would grow to 43 officers and 1,936 enlisted men (increases of 59 and 348 percent respectively). Twenty-five of these two-battalion regiments would field an infantry force of 50,000 men. Upton further proposed that the army add additional battalions to these regiments if a larger force was required.[81] By increasing the number of battalions in a regiment from two to three to four, Upton showed that the size of the infantry could be increased from 50,000 to 75,000 to 100,000 men.

Upton proposed similar structures for cavalry and artillery forces though these regiments were less "expansible." The two-battalion infantry regiment grew to 4.3 times its peacetime size in wartime. Upton's cavalry regiments had 699 officers and men in peacetime and would grow to 1,325 officers and men in wartime (1.9 times its peacetime size).[82] Upton also proposed five artillery regiments with a peacetime size of 3,335 officers and men that

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[80] Upton (1878), p. 338-341

[81] Upton proposed four ways for obtaining additional officers: (1) allowing non-commissioned officers to take a special exam, (2) recruit graduates who have studied at colleges where officers of the army taught, (3) recruit graduates of all Military Academies, (4) allow officers in the militia to take a special exam.

[82] Upton (1878), p. 345

would expand to 9,100 officers and men in wartime (2.7 times its peacetime size). In Upton's

plan, infantry were the most "expansible" followed by artillery and then cavalry.

Upton's proposed force would maintain the same structure in both peacetime and

wartime: twenty infantry regiments, ten cavalry regiments and five artillery regiments. The

size of these regiments would be at one of four levels: peacetime, first basis (two-battalion),

second basis (three-battalion), or third basis (four-battalion) depending on the requirement

for forces. Table 2.1 shows the size of each branch of the army at each level of expansion.

Table 2.1—Size of Upton's Expansible Army[83]

	Peacetime	**First Basis**	**Second Basis**	**Third Basis**
Infantry	12,500	51,900	76,850	101,800
Cavalry	6,990	13,250	13,250	19,490
Artillery	3,335	8,708	15,318	18,340
Total	22,825	74,250	105,418	139,630

Upton's army could expand from a peacetime size of 22,825 officers and men to as large as

139,630 officers and men in wartime.

Upton provides little justification for his cadre army proposal except references to

the successes of the German Army. Ambrose argues that one of Upton's major problems in

arguing for this force was "the lack of any obvious danger which could justify a major and

expensive reform."[84] Upton desired to attach a historical analysis of American military policy

to *The Armies of Asia and Europe* to point out its faults. However, he was advised not to by

General-in-chief William Tecumseh Sherman so as not to offend those in Congress who

could legislate changes. When Upton's recommendations in *The Armies of Asia and Europe*

were disregarded by most people outside of the army, he began writing a new book to "show

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[83] Upton (1878), p. 350-351
[84] Ambrose (1964), p. 105

that instead of securing national economy by keeping the army too small, and without a proper expansive organization, we have prosecuted all of our wars with a waste of life and treasure which finds no parallel."[85]

2.3.3—*The Military Policy of the United States*

Upton's next book, titled *The Military Policy of the United States*, argued more convincingly for a cadre force. This book provided a detailed history of American military policy through 1862. Weigley says of the book: "he wrote clearly and persuasively; no comparable American military history existed or was to exist for decades."[86] However, the history was written to reinforce Upton's desire for a cadre army and therefore "persuaded many who would not otherwise have been receptive, because they studied the American military past from no other angle of vision."[87] Upton argued throughout this book that money and lives could have been saved in all wars in which the U.S. was involved if they had not relied on a militia system and instead had maintained a cadre system.[88] Upton made all of the arguments against the militia discussed in Section 2.1 including making George "Washington 'his principal witness in behalf of … [the expansible army]'."[89] Upton was not critical of the militiamen themselves but instead of the militia system. He felt that it was less expensive to maintain a cadre army than it was to remedy the problems with the militia system. Ambrose argues that "Upton maintained that there was no point in attempting to strengthen or reform the militia, because it would be cheaper and more efficient to improve

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[85] Ambrose (1964), p. 117
[86] Weigley (1984), p. 278
[87] Weigley (1984), p. 278
[88] Upton also contrasts the successes of the Navy, a federally controlled force, with the failures of the army to further emphasize the faults with the militia system.
[89] Ambrose (1964), p. 126

the regular army."[90] Ambrose summarizes Upton's argument: "the whole point of his study of military policy of the United States was not, then, to attack the militia … He wanted a militia, that is, some form of civilian reserve, but he wanted it under professional control."[91] However, Upton's work would be interpreted to mean that the militia could never be relied upon.

Upton never finished writing his book; he committed suicide on March 15, 1881[92] having never seen any of his recommendations regarding American military policy implemented.[93] However, his manuscript was widely circulated before it was eventually published in 1904.[94]

2.3.4—Upton's Legacy

Although *The Military Policy of the United States* was not officially published until 1904, many military officers and congressional representatives had known of its existence and read drafts before that time. Many of these individuals were swayed by Upton's argument and lobbied for a cadre system.[95] The cadre-militia debate would go on informally throughout the late nineteenth century and into the early twentieth century. Upton's arguments heavily influenced this debate. However, although the military elite may have supported a cadre system, Congress supported a reliance on the militia. The experiences of the Spanish-American War would lead many in Congress to rethink their assumptions about the

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[90] Ambrose (1964), p. 113

[91] Ambrose (1964), p. 135

[92] Upton's suicide was preceded by years of headaches that Ambrose attributes to a possible tumor. [Ambrose (1964), p. 143]

[93] His recommendations for improved tactics had already been widely accepted in the United States Army.

[94] Brown (1953), p. 128

[95] Speaking about the late 19th and early 20th century, Jacobs (1994) argues that "Upton's ideas were widely accepted throughout the Regular Army of that era." [Jacobs (1994), p. 32]

readiness of the militia. It was only after the Spanish-American war that Upton's ideas were

brought to the forefront of a debate about American military policy.

3. A STRONGER MILITA

Unlike earlier nineteenth century wars, the Spanish-American War served as an impetus for significant reform. The experiences of the Spanish American War led to a change in both the perceived threat and the perceived readiness of the reserves. The Army perceived a more imminent threat because the Spanish-American War led many to reconsider the protection provided by geographic isolation. The poor performance of the reserves in the Spanish-American War also led many to question their readiness. Both of these changes led some military professionals to propose "Uptonian" cadre forces. Secretary of War Elihu Root first tried to convince Congress to accept a cadre force in 1903. Congress rejected his proposal and instead passed legislation to remedy the problems with the militia. In 1910, Army Chief of Staff Leonard Wood tried to resurrect Upton's cadre proposal. However, Wood was unable to justify such a force when there appeared to be no imminent threat.

Recognizing the failures of the militia, but unwilling to accept a cadre force, some military professionals and Congressmen responded to cadre proposals with plans to strengthen the militia. In 1912, Secretary of War Henry Stimson published a report that emphasized that the militia would be the nation's primary fighting force. This marked the first time that anyone from the defense establishment outwardly rejected the cadre idea. Affirming this policy, Congress passed the Volunteer Act of 1914 and the National Defense Act of 1916. Both of these acts strengthened the militia. This legislation addressed each of the concerns raised by cadre proponents that were discussed in Section 2.1.4. This invalidated many of the arguments for a cadre force made by Calhoun and Upton.

3.1—THE SPANISH-AMERICAN WAR

The impetus for resurrecting the debate about cadre forces was the Spanish-American War. When the battleship Maine exploded in Havana harbor, there were a total of 28,747 officers and men in the United States Regular Army.[96] This army was not large enough to fight the Spanish who had nearly 80,000 soldiers in Cuba.[97] In response, Congress authorized the president to increase the size of the army by mobilizing the militia in the Volunteer Act of 1898.[98] The Volunteer Act addressed two of the problems with the militia by enlisting militiamen as individuals rather than units so they could be used overseas and by specifying two-year enlistments. However, many of the militia policies criticized by Emory Upton remained in place.

The Spanish-American War highlighted two major problems with the militia. First, many militia units refused to "volunteer" for service. This was exemplified by the 7th Regiment of New York, which refused to "merge its identity in a Federal army run by 'West Point martinets.'"[99] The second issue was the condition of those militia units that did volunteer. Millis argues that "they were untrained, ill-equipped, sometimes without proper clothing and even without shoes; none had modern weapons and they were wretchedly deficient in the simplest skills of military life" and equally important "their officers were seldom competent."[100] Only two regiments from the militia ever saw significant action in the

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[96] This was equivalent to 39 troops on active duty per 100,000 residents. This was significantly lower than the average peacetime size of the army during the 19th century (64 troops per 100,000 residents). [U.S. Census Bureau (1975), p. 1140-1143 and U.S. Census Bureau (2002), p. A-1]

[97] Weigley (1984), p. 295

[98] United States Congress (1898)

[99] Millis (1956), p. 174

[100] Millis (1956), p. 174

Spanish-American War, which prevented a full analysis of their effectiveness.[101] Still, the

main lesson from the Spanish-American War was that the militia was not an effective

fighting force. Millis argues that : "it was obvious that it would have taken a long time to

make an effective force out of the National Guard units which turned out in 1898; it was

even more obvious that the whole Army system called for reform."[102] The Spanish-

American War served as the impetus for this reform, which began with the Dick Act of

1903.

3.2—ELIHU ROOT AND THE DICK ACT

The experience of the Spanish-American War renewed the debate about the proper

peacetime establishment of the U.S. Army. Emory Upton's cadre proposal was resurrected

in this debate. The first proponent of a cadre force was Secretary of War Elihu Root. Root

was a lawyer with little knowledge of military affairs upon his appointment but he

"attempted a conscientious study of foreign military organization and American reform

proposals."[103] In his readings, Root came across Upton's manuscript: *The Military Policy of the

United States*. Root was so impressed with Upton's manuscript that he had it published at the

expense of the War Department. Based on his study of military policy, Root proposed a

number of significant reforms. One of these reforms was a federally controlled reserve that

would be used to fill out an Uptonian cadre force in wartime.[104] Root faced intense

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[101] Weigley writes about the relative effectiveness of the militia: "The Uptonians cited the conduct of several other volunteer regiments as further proof of the inferiority of citizen soldiers, especially in regiments drawn from the state militia." [Weigley (1984), p. 306]

[102] Millis (1956), p. 174

[103] Weigley (1984), p. 315

[104] Ambrose (1964), p. 155. However, Weigley argues that "Root was too much the civilian and had too much common sense to swallow Upton whole …. It was less Upton's general theme that Root praised than his more

opposition to his cadre-like system as Millis writes: "it had become evident, as Root put it,

that the National Guard lobby would be able 'to defeat any measure' for a reserve system

'which did not commend itself to them;' so the Secretary had to abandon his ideas for

incorporating the Guard into a Federally controlled reserve."[105] Root compromised in order

to have some of his other reforms adopted by dropping the requirement for a federally

controlled reserve and Congress passed the Dick Act of 1903.[106] This act asserted that the

National Guard (militia) would be the primary expansion force of the U.S. Army.

The Dick Act of 1903 created two classes of militia: "the organized militia, to be

known as the National Guard … and the remainder to be known as the Reserve Militia."[107]

The Act specified that the National Guard "was to be organized, trained and equipped

uniformly with the regular Army; the Federal government assumed responsibility for

providing weapons and equipment as well as regular Army officers as instructors."[108] This

was the first time that the government had taken responsibility for training and equipping

the militia (henceforth referred to as the National Guard). The Act also required National

Guard units to hold at least twenty-four drills plus a "summer" encampment of not less than

five consecutive days.[109] Weigley argues that "the Dick Act … laid a foundation for

cooperation of a continually improving kind between the Regular Army and the only reserve

force that in 1903 was feasible."[110]

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detailed reform proposals." [Weigley (1984), p. 315] Nonetheless, it is hard not to see the components of
Upton's reform proposals in Root's recommendations.
[105] Millis (1956), p. 177
[106] Root's other major concern was creating a general staff in order to have continuity in war planning.
[107] United States Congress (1903)
[108] Millis (1956), p. 179
[109] Weigley (1984), p. 321
[110] Weigley (1984), p. 322

The Dick Act attempted to remedy many of Upton's concerns about the militia by providing for an adequately trained and equipped force. However, many of Upton's concerns were not addressed in the first draft of this law, most noticeably: short-enlistments and the ability to use the militia outside of the continental United States. In 1908, the Dick Act was revised to remedy these two issues. The restriction on federal service was changed from nine months "to cover the period of enlistment" and "the restriction limiting service of the Militia to the continental United States was removed."[111] Furthermore, the Act of 1908 required that in order to be classified as a National Guard "all state forces must have the same organization, armament, and discipline as the Regular Army."[112]

Of all of the problems with the militia raised by cadre proponents, the Dick Act addressed all but two of them. The remaining issues were the quality of militia officers and the voluntary nature of the states provision of troops. The Dick Act indirectly addressed concerns about the quality of militia officers by allowing them to attend Regular Army schools and required that their units be disciplined to the standard of Regular Army units. The Dick Act did not address the ability of states to refuse to provide troops. Before the Dick Act was passed, there was no debate about the relative cost-effectiveness of increasing the readiness of the reserves versus maintaining a cadre force. Congress decided to strengthen the National Guard rather than change to a cadre system based more on their support for the National Guard than on a cost-effectiveness analysis. As discussed earlier, the militia (National Guard) had significant lobbying power in Congress because they were

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[111] Kreidberg and Henry (1955), p. 180. In 1912, the law allowing the use of the militia outside the U.S. was ruled unconstitutional.

[112] Kreidberg and Henry (1955), p. 180

well organized, distributed across nearly all Congressional districts, and at the beginning of

the 20ᵗʰ century were still strongly tied into local politics.

3.3—PREPARADNESS AND LEONARD WOOD

Although the Dick Act seemed to address many of the concerns about the militia,

there was little difference in the readiness of the National Guard after its passage. Concerns

about readiness were brought to light by the preparedness movement, which resurrected the

debate about cadre forces.

The preparedness movement began in 1907 when President Theodore Roosevelt

announced that he thought the army was too small and that a cadre force was needed.

Roosevelt proposed: "we should maintain in peace a fairly complete skeleton of a large army

… It is essential that we should possess a number of extra officers trained in peace to

perform efficiently the duties urgently required in war."[113] Roosevelt was arguing for a cadre

force because he was concerned about having to face the much-larger armies of Europe.[114]

Following this, in 1908, a series of magazine articles on the military unpreparedness of the

United States led congress to inquire about the state of the country's military defenses.[115]

The Army War College prepared a report for congress which described the "deplorable

condition of the militia: (1) deficiency in training, (2) lack of physical stamina, (3) woeful

understrength, (4) lack of arms of all kinds, and (5) poor organization."[116] However, Millis

argues these concerns were ignored because "there was no 'respectable adversary' reasonably

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[113] Millis (1956), p.194

[114] In the early 20ᵗʰ century, both Germany and France maintained about 800,000 men in uniform during peacetime compared to about 80,000 (average from 1901 through 1914) in the United States. [Millis (1956), p. 206 and U.S. Census Bureau (1975), p. 1140-1143]. Germany and France were also capable of mobilizing many more troops more rapidly than the United States.

[115] Kreidberg and Henry (1955), p. 180

[116] Kreidberg and Henry (1955), p. 181

within sight."[117] Nonetheless, Army Chief of Staff Leonard Wood took these observations

seriously and set out to bring about change.

Like Upton, Leonard Wood was attracted to the cadre army idea by a fear of having

to fight an army the size of Germany (87 divisions, 1,750,000 "first-line troops") or France

(62 divisions, 1,500,000 "first line troops").[118] Like Upton, Wood based his cadre proposal

on the armies of Europe. He thought "the cadre army, relying upon trained reservists to fill

its ranks swiftly to colossal wartime proportions, was the great military invention of

continental Europe."[119] However, he knew that the foundation of these systems was

conscription, which Millis claims "no American officer in 1910 could have dared even hint

at."[120] Millis argues that "Wood had to establish his cadre army first; conscription would

follow (as in fact it did) almost inevitably."[121] Wood began by proposing a federal reserve

and changing the Regular Army enlistment contract from three years to two with the

additional obligation to serve for seven or eight years in the reserve.[122] Millis argues that

"within a few years this would have yielded … a trained and organized reserve army of

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[117] Millis (1956), p. 199

[118] Weigley (1984), p. 336

[119] Millis (1956), p. 201.

[120] Millis (1956), p. 201. Nonetheless, Wood argued for universal military training (peacetime conscription) in his 1916 book: *Our Military History: Its Facts and Fallacies*. In this book, Wood repeatedly mentions the need for universal military training by arguing that relying on the militia or wartime volunteers was not effective. Wood wrote: "we must no longer place reliance upon plans based upon the development of volunteers or use of the militia. The volunteer system is not dependable because of uncertainty as to returns … Dependence on the militia … spells certain disaster, not because of the quality of the men or officers but because of the system under which they work." [Wood (1916), p. 196] However, it appears Wood never made public statements advocating peacetime conscription.

[121] Millis (1956), p. 201

[122] Wood's support for a cadre force is evidenced by his praise for John C. Calhoun's expansible army. Speaking of the Calhoun plan Wood says: "Fortunate, indeed, would we have been had this policy been adopted, provided we had a reserve of trained men to bring the organization to war strength." [Wood (1916), p. 138] Wood proposed lengthening enlistment contracts to create this reserve of manpower to fill cadre units in wartime, an issue that Calhoun and Upton both ignored in their proposals. This was similar to the German army system that so impressed Upton in the late 19th century.

280,000 men … without having to bother with the National Guard at all."[123] This proposal was supported by many military professions but lacked a significant following due to the lack of an imminent threat. Therefore, Wood focused his attention on "spreading of the word of American unreadiness."[124]

Wood had a number of allies in this campaign including Major John H. Parker who published *Trained Citizen Soldiery* and Frederic Louis Huidekoper who published *The Military Unpreparadness of the United States*.[125] In his book, Huidekoper copied whole passages from Upton's *The Military Policy of the United States* as he argued for a cadre force. Wood also published a book arguing for a cadre force backed by a federal reserve force entitled *Our Military History: Its Facts and Fallacies*. In his book, Wood makes the same argument as Emory Upton that "unnecessary cost in life and treasure which has characterized the conduct of our wars" was due to "the defects, weakness, and unreliability of our militia and volunteer systems."[126] However, without an imminent threat most of these proposals were ignored.[127]

At the same time that Wood and his followers were proposing a cadre force, Secretary of War Henry Stimson published a report in 1912 which Weigley argues "made a historic departure from the expansible army plan which had been advocated not only by Upton but by Calhoun … it proposed a Regular Army not skeletonized but ready to fight immediately."[128]

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[123] Millis (1956), p. 201

[124] Millis (1956), p. 201

[125] Parker (1916) and Huidekoper (1915)

[126] Wood (1916), p. 12, 18. He argues for a cadre force of reserve officers similar to the Officers' Reserve Corps created after World War I [Wood (1916), p. 212].

[127] In response to a request for information on the "subject of military instruction in colleges, military reserves, methods of enlistment, and the exact nature of the measures either now in force or contemplated to safeguard the Nation," Wood responded with a report emphasizing the benefits of a cadre force. Wood wrote little on military policy that did not argue for a cadre force [United States War Department (1914)].

[128] Weigley (1984), p. 339

3.4—THE STIMSON REPORT

In 1912, the U.S. War Department published the *Report on the Organization of the Land Forces of the United States*.[129] Secretary of War Henry Stimson published the report but the ideas in it came mainly from Captain John McAuley Palmer, assigned to the General Staff. Palmer believed that National Guard officers were just as competent as Regular Army officers based on his lineage. His grandfather had commanded in the Civil War as a Major General and was regarded as "one of the successful citizen soldiers of the Civil War."[130] Palmer rejected the cadre army because he was unable to reconcile the military needs (a large peacetime nucleus) with the political constraints (a small peacetime force).[131] In the *Report on the Organization of the Land Forces of the United States*, Palmer proposed: "the military establishment in time of peace is to be a small Regular Army and that the ultimate war force of the Nation is to be a great army of citizen soldiers."[132] The Stimson report was the first time that any prominent military professional had publicly rejected the idea of a cadre force. John McAuley Palmer felt that his plan was consistent with the peacetime army proposed by George Washington more than a century earlier: "the Stimson plan of 1912 is merely a

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[129] United States War Department (1912)

[130] Weigley (1984), p. 339

[131] Palmer began his analysis by "working out the expansible scheme in detail." However, he found that "the results were discouraging." Palmer wrote: "when I assumed a peacetime nucleus big enough to make a real foundation for effective expansion for a great war, I found that the American people would be saddled with a big standing army in time of peace. When I assumed a peacetime nucleus small enough to give any chance of acceptance by Congress, it would result in too small a war army- unless, like Upton and Sherman, I also assumed a rate of expansion that would be obviously absurd." [Palmer (1941), p. 126] Like the arguments of Calhoun and Upton, Palmer framed this problem as an either/or decision; either the army would depend on the militia or it would depend on a cadre force. There was no discussion of force mix. This was true for nearly all force structure debates involving cadre prior to World War I.

[132] Kreidberg and Henry (1955), p. 183.

logical twentieth-century adaptation of the Steuben plan of national military organization which Washington approved in 1784."[133]

Although the Stimson plan deviated sharply from previous recommendations from the War Department, there was little immediate response because "the War Department report could not make a permanent policy commitment."[134] However, the report would serve as the basis for future policy recommendations made by the War Department.[135] It appeared that the military establishment had rejected the cadre forces of Calhoun and Upton. However, Congress had not yet created any legislation to support a new system.

3.5—LEGISLATING FOR A NEW MILITARY POLICY

The Stimson plan rejected the cadre force of Emory Upton in favor of a fully formed Regular Army supported by the National Guard. Although not immediately implemented, this new military policy would be the subject of great debate and would finally lead to Congressional legislation in the Volunteer Act of 1914 and the National Defense Act of 1916. These acts further strengthened the National Guard.

Congress passed the Volunteer Act of 1914 with the goal of strengthening the National Guard.[136] This Act allowed the President to use the National Guard outside of the United States by allowing Guard personnel to volunteer as individuals into federal service

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[133] Palmer (1941), p. 132
[134] Weigley (1984), p. 340
[135] Reports published by the War Department in 1915 and 1916 were based on the *Report on the Organization of the Land Forces of the United States* [United States War Department (1915), United States War Department (1916)].
[136] United States Congress (1914)

where they would be united with their Guard unit.[137] This addressed another concern of

cadre proponents about the militia.

When Woodrow Wilson became President, Leonard Wood resigned his post to

spread the preparedness message. With tensions growing in Europe in 1915, it was not hard

to find supporters for preparedness. These supporters included new Secretary of War

Lindley Garrison. In the *Statement of a Proper Military Policy for the United States*,[138] Garrison

proposed a cadre force similar to that proposed by Leonard Wood: a larger Regular Army

with "a federal reserve of trained soldiers, obviously destined for a larger role than the

Guard."[139] This cadre proposal had great support from members of the preparedness

movement but like all previous cadre proposals, it was met with great opposition from

Congress. House Military Affairs Committee Chairman James Hay was an outspoken

opponent. Weigley argues that Hay and his supporters "felt misgivings about the Continental

Army and the eclipse of the National Guard on states'-rights grounds," furthermore, "the

National Guard Association cultivated such misgivings."[140] Instead, Hay proposed

strengthening the National Guard. This was the conventional Congressional response to

cadre proposals since 1903. After some debate, Hay got his way and Congress passed the

National Defense Act of 1916.[141]

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[137] The act stated that volunteers could be used outside the continental United States. Therefore, if National Guard members were mobilized as volunteers they could be sent overseas where the Army promised that they would be united with their National Guard unit.

[138] United States War Department (1915)

[139] Weigley (1984), p. 344. Garrison's proposal was supported by the General Staff of the Army. Palmer argues that even though President Woodrow Wilson "had clearly called for the development of Washington's citizen army and … rejected Upton's expansible army … the officers of the General Staff did not accept the military policy laid down by the President of the United States." [Palmer (1941), p. 143-145]

[140] Weigley (1984), p. 345. Millis also makes this point: "The National Guard was in violent protest against its own proposed emasculation … It also represented one of the remaining vestiges of state sovereignty, now being so rapidly swept away upon the tides of massive centralization." [Millis (1956), p.222]

[141] United States Congress (1916)

The National Defense Act of 1916 further weakened the arguments against the militia made by cadre proponents by strengthening the National Guard.[142] The Act placed the "National Guard under increased federal supervision, with its officers and men sworn upon enlistment to obey the President … it would prescribe standards for Guard officers and moreover it would prescribe the units that the Guard should maintain."[143] This legislation remedied nearly all of Upton's concerns about the militia and left cadre proponents with few remaining arguments. However, World War I would bring the realities of total mobilization to the forefront of American military planning and provide a new argument for cadre units without the need to argue against the readiness of the National Guard.

3.6—THE EVOLUTION OF CADRE PROPOSALS

We have seen that the arguments for a cadre force continued well beyond the proposals of Calhoun and Upton. Upton's proposal served as the basis for almost all pre-World War I force structure proposals from the army. These proposals continued to meet strong resistance from militia (National Guard) supporters, and most importantly, from the United States Congress. Congress responded to calls for a cadre army by strengthening the National Guard. This legislation weakened the arguments for a cadre force made by Upton's disciples. By World War I, the only remaining concern with the militia was the need to depend on the National Guard units to volunteer for service.[144]

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[142] Like all previous legislation to strengthen the National Guard, there was no debate about the cost-effectiveness of strengthening the Guard versus maintaining a cadre force. Cost was rarely discussed in these debates.

[143] Weigley (1984), p. 348

[144] This was fixed by the National Defense Act of 1933, which created the National Guard of the United States (as opposed to the National Guard) which could be "ordered into federal service as units under the army clause when Congress declared a national emergency." [Jacobs(1994), p. 40]

Congress asserted that the Guard would be the Nation's primary wartime expansion force. The arguments of Upton were nearly irrelevant. However, the number of troops required in World War I would sustain the cadre idea. The Regular Army and National Guard were not large enough to meet the requirements of the First World War. Instead, new units were created from scratch. This experience was salient in the minds of post war military planners and provided a new role for cadre units.

4.   CADRE IN WORLD WAR I

World War I required the deployment of millions of soldiers overseas. This led to an

army that was, in absolute terms, many times larger than it had been in any previous war.[145]

This experience had two opposing effects on the debate over a cadre force. First, the

experience of creating new units from scratch in World War I provided a simplistic

argument for cadre opponents that a cadre force was not effective. Second, the introduction

of conscription as the main source of wartime manpower would reduce the uncertainty

associated with previous cadre proposals, which were vague as to how cadre units would be

filled with junior personnel in wartime.

4.1—A SIMPLISTIC ARGUMENT AGAINST CADRE

World War I required activating and deploying all existing Regular Army and

National Guard units as well as creating new units from scratch. Weigley argues that one of

the major delays in the deployment of U.S. troops to Europe was the "necessity to provide

trained officers and n.c.o's before assembling the recruits" for new units.[146] Faced with the

need to create new units as quickly as possible, the World War I Army followed the

Uptonian doctrine of "scattering the Regular Army to form cadres for the conscripted

National Army."[147] However, given the size of the pre-war army,[148] it was impossible to

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[145] During World War I, the Army grew as large 3.7 million troops. In relative terms, this was 3,593 troops per 100,000 U.S. residents. During the Civil War, the Union Army grew as large as 1 million troops. In relative terms, this was 2,859 troops per 100,000 residents. Since this does not include the Confederate Army; it is unclear whether the relative size of the WWI Army was larger or smaller than that of the Civil War. Nonetheless, in absolute terms, the number of troops needed in World War I was significantly larger. [Kreidberg and Henry (1955), p. 246, U.S. Census Bureau (1975), p. 1140-1143, and U.S. Census Bureau (2002), p. A-1]

[146] Weigley (1984), p. 372

[147] Weigley (1984), p. 372

distribute enough Regular Army officers and NCOs to train new units filled by conscripts.[149]

Kreidberg and Henry argue that this experience invalidated the cadre concept: "The inherent

fallacy of the "expansible army" theory was apparent; there were not enough enlisted men,

or officers, in the Regular Army to provide the cadre skeletons for the rapidly and hugely

expanding Army of the United States."[150]

The argument made by Kreidberg and Henry is simplistic because a peacetime cadre

force did not exist before the war. After 1912, the War Department based its planning and

budgeting on the assumption that the National Guard would be the primary expansion force

of the army. There was no money budgeted for maintaining a surplus of officers to expand

the army in wartime. Money that could have been used to build a large peacetime nucleus for

a cadre force instead went to the National Guard. Therefore, it is no surprise that the Army

lacked the officers needed to expand quickly during the war. Although it is unclear if a cadre

force would have been able to provide the number of officers needed for the massive

expansion of World War I, it was unfair to argue that the World War I experience

invalidated the cadre idea.

4.2—CONSCRIPTION

The use of conscription in World War I reduced one of the major uncertainties of

relying on a cadre force. World War I marked the second time in U.S. history that the

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[148] The average number of army personnel on active duty in the three years preceding U.S. involvement in World War I was 105,000 or 106 troops per 100,000 residents. [U.S. Census Bureau (1975), p. 1140-1143 and U.S. Census Bureau (2002), p. A-1]

[149] Weigley writes: "The expansible army plan broke down because the Regulars, both officers and enlisted men, would have been swamped if they had been dispersed among the draftees." [Weigley (1984), p. 372]

[150] Kreidberg and Henry (1955), p. 294

government relied on conscription to create a wartime army.[151] The move towards

conscription began in 1916 when increasing the size of the army with volunteers proved

difficult. In 1916, the Regular Army had 107,000 officers and men and the National Guard

had 133,000 officers and men.[152] The National Defense Act (NDA) of 1916 called for

significantly increasing the size of both components. The impetus for this change was the

problems the U.S. Army encountered in mobilizing for war with Mexico in early 1916.[153]

The NDA of 1916 called for a Regular Army of 175,000 officers and men (a 63 percent

increase) and a National Guard of 475,000 officers and men (a 250 percent increase).[154] Both

the Regular Army and the National Guard had trouble recruiting this larger force. Chief of

Staff Hugh Scott expressed this in his annual report released in late 1916:

> "The difficulty that is now being experienced in obtaining recruits for the Regular
> Army and for the National Guard raises sharply the question of whether we will be
> able to recruit the troops authorized by Congress in the National Defense Act… The
> failure should make the whole people realize that the volunteer system does not and
> probably will not give us either the men we need for training in peace or for service in
> war."
>
> -   Hugh Scott, 1916[155]

President Wilson and Secretary of War Newton Baker, who asked Scott to prepare a plan for

universal military training, shared Scott's concerns. As part of this plan, President Wilson

instructed Secretary of War Baker to include a conscription bill. This bill became the

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[151] The first time was the Civil War.

[152] U.S. Census Bureau (1975), p. 1140-1143 and Doubler (2000), p.139. In relative terms the size of the
Regular Army was 106 troops per 100,000 residents and the size of the National Guard was 133 troops per
100,000 residents. [U.S. Census Bureau (1975), p. 1140-1143 and U.S. Census Bureau (2002), p. A-1]

[153] Weigley writes: "preparation for a possible small war in Mexico imposed a sufficient strain upon the
American military system to assure that many traditional American habits would have to be sacrificed if now
the nation entered the great European war." [Weigley (1984), p. 351]. The main "habit" Weigley refers to is
volunteerism; he implies that conscription would be needed if the U.S. entered the war in Europe. For more
detail on the Mexican mobilization of 1916 see: Millis (1956), p. 228-231 and Weigley (1984), p. 247-352.

[154] In relative terms the proposed size of the Regular Army was 175 troops per 100,000 residents and the
proposed side of the National Guard was 474 troops per 100,000 residents. [U.S. Census Bureau (1975), p.
1140-1143 and U.S. Census Bureau (2002), p. A-1]

[155] Millis (1956), p. 232

Selective Service Act of May 18, 1917.[156] The bill authorized a Regular Army of 488,000, a

National Guard of 470,000 and a "National Army" initially of 500,000 with men to be added

in 500,000 increments "as rapidly as receiving and training facilities could be provided," until

the demand for forces was met.[157] Conscription would supply the majority (sixty-seven

percent) of the manpower for World War I.

       Had they been able to openly propose it, it is likely that conscription would have

been a key component of the cadre proposals of Emory Upton, Elihu Root, and Leonard

Wood. All three men proposed cadre forces based upon the armies of Germany and France,

each of which relied upon a federal reserve sustained by peacetime conscription to fill out

cadre units in wartime. However, conscription had only been used once before in the United

States. Each of these men, knowing the political realities, excluded conscription from their

proposals in the hopes that it might be more palatable. As discussed in the sections

describing the cadre proposals of each of these men, a number of historians argued that

none of these men "dared" to raise the possibility of conscription publicly. The use of

conscription in World War I made it more likely that conscription might be used in future

wars, especially in wars of similar magnitude to World War I. This increased the

attractiveness of a cadre force because it reduced the uncertainty about how a skeletonized

force would be filled out in wartime, a concern that remains important for the cadre forces

analyzed in this dissertation.

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[156] Weigley (1984), p. 354

[157] Millis (1956), p. 236. The relative size proposed Regular Army was 480 troops per 100,000 residents; the relative size of the proposed National Guard was 463 troops per 100,000 residents. [U.S. Census Bureau (1975), p. 1140-1143 and U.S. Census Bureau (2002), p. A-1]

5.   CADRE IN THE INTERWAR PERIOD

Legislation for a better-organized and trained National Guard weakened the arguments made by cadre proponents. However, cadre proposals did not disappear with these changes. Two features of the post-World War I world, both unplanned, would keep the cadre idea alive. First, the War Department changed its assumption about the perceived threat following World War I. The War Department focused almost solely on planning for total mobilization.[158] This led to the creation of a third force, the Organized Reserves, which existed alongside the Regular Army and National Guard. The Organized Reserves was intended as a non-drilling force of officers and enlisted men but, in practice, had only officers. The Organized Reserves were an unplanned cadre force. The second feature of the interwar period was the Army's insistence on skeletonizing the Regular Army when faced with budget cuts. When faced with a decision on how to reduce the size of the force, the professional military personnel in the War Department returned to the ideas of Upton and cut enlisted end-strength to a larger degree than they did officer end-strength. During the interwar period, two cadre forces existed: a skeletonized Regular Army and the Organized Reserves.

5.1—THE ORGANIZED RESREVES: A CADRE FORCE

The United States Army of World War I looked nothing like the peacetime army that preceded it. At the beginning of U.S. participation in World War I, on April 1, 1917, the Regular Army consisted of 213,557 officers and men. By November 11, 1918, the Army had

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[158] For a full discussion of post-World War I mobilization planning see: Kreidberg and Henry (1955), p. 382-492.

grown to 3,685,458 officers and men, more than 17 times larger than the army that existed before the war.[159] After the war, army planners began considering how to prepare for future wars of similar size.[160] Initially, the Army proposed a cadre force similar to that proposed by Emory Upton. Congress opposed this plan because it did not include the National Guard. Instead, Congress modified a proposal written by John McAuley Palmer. Palmer's proposal became the National Defense Act (NDA) of 1920. The NDA of 1920 rejected the Uptonian cadre force but created a new type force, which would become, without explicitly planning for it, a cadre force. This cadre force would be different from those proposed in the past, as it existed alongside, not in replacement of, the National Guard.

5.1.1—The Post-War Debate

Following the end of World War I, the War Department recommended a peacetime cadre army. Chief of Staff Peyton March proposed a permanent Regular Army of 500,000 men "skeletonized to about 50 per cent of its strength … with a system of universal military training which will ensure an adequate reserve."[161] This proposal was unacceptable to Congress.[162] Congress was frustrated by the lack of a plan that considered its desire to have

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[159] Kreidberg and Henry (1955), p. 246. In relative terms, the size of the army grew from 210 troops per 100,000 residents to 3593 troops per 100,000 residents. [U.S. Census Bureau (1975), p. 1140-1143 and U.S. Census Bureau (2002), p. A-1]

[160] After WWI there was significant public disagreement over national defense policy. Some argued for a return to isolationism while others argued for a larger or more rapidly expandable military. The War Department focused on planning total mobilization [Kreidberg and Henry (1956), p. 382]. Weigley argues that: "the Army's leaders had to reckon with the possibility of a future war of a similar kind, and to try to ensure that the United States would be better prepared for a recurrence of such war, despite a military tradition of looking mainly to the defense of the continental homeland." [Weigley (1984), p. 395]. In this section, we consider only the military's post-WWI force structure proposals. It is important to keep in mind that many civilians perceived the threats to the United States differently as they felt WWI was "the war to end all wars."

[161] Millis (1956), p. 241

[162] Millis argues that March's proposal was "a good try; it was also hopeless, in the atmosphere of 1920." [Millis (1956), p. 241]

the National Guard be the nation's primary wartime expansion force.[163] Weigley argues that "Congress nearly despaired of getting a useful military bill, since the Army clung stubbornly to Emory Upton while the legislators would not yield to him."[164]

Colonel John McAuley Palmer, the man behind the Stimson report, provided a competing proposal, more palatable to Congress. Palmer argued against the War Department proposal and instead "suggested a much smaller Regular Army, whose formations would not be skeletonized but essentially complete."[165] Palmer proposed the Swiss citizen Army as a model "with its professional soldiers mainly the trainers of citizen formations."[166] Palmer argued that "companies, regiments, and divisions should be organized in peace to prepare for war, but they should be mostly citizen-army formations, not Regular Army units in which citizen soldiers would be absorbed and submerged."[167] Palmer's proposal impressed the House Committee so much that it asked the War Department to release him to help write a new military law.[168] The new law became the National Defense Act of June 4, 1920.

5.1.2—The National Defense Act of 1920

The National Defense Act (NDA) of 1920 called for a fully manned Regular Army of 280,000 men that would be ready to deploy quickly.[169] Behind this, "the principal military

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[163] The National Guard lobby had a significant impact on Congressional reaction to this cadre proposal. Jacobs argues: "Guardsmen were convinced that the Regular Army, in the pattern of Calhoun and Upton, sought to oust the National Guard from the place it had earned in the military establishment." [Jacobs (1994), p. 42]

[164] Weigley (1984), p. 397

[165] Weigley (1984), p. 397

[166] Weigley (1984), p. 398

[167] Weigley (1984), p. 398

[168] Palmer (1941), p. 160

[169] United States Congress (1920). This was equivalent to 265 troops per 100,000 residents. [U.S. Census Bureau (1975), p. 1140-1143 and U.S. Census Bureau (2002), p. A-1]

reliance of the country was to be placed forthrightly upon citizen soldiers."[170] Recognizing

that these forces alone would not be large enough to fight another World War, the NDA of

1920 created another force called the Organized Reserves.

The NDA of 1920 called for Organized Reserve units that would be manned in

peacetime with officers from the Officers' Reserve Corps (ORC) and enlisted personnel

from the Enlisted Reserve Corps (ERC). Officers in the ORC were commissioned through

either the Reserve Officers Training Corps (ROTC) or the Citizens Military Training Camps

(CMTCs).[171] The ERC was a federal reserve of enlisted personnel established by the NDA

of 1920.[172]

The NDA of 1920 divided the nation into nine corps areas as shown in Figure 5.1.

Figure 5.1—Nine Corps Areas Outlined in National Defense Act of 1920[173]
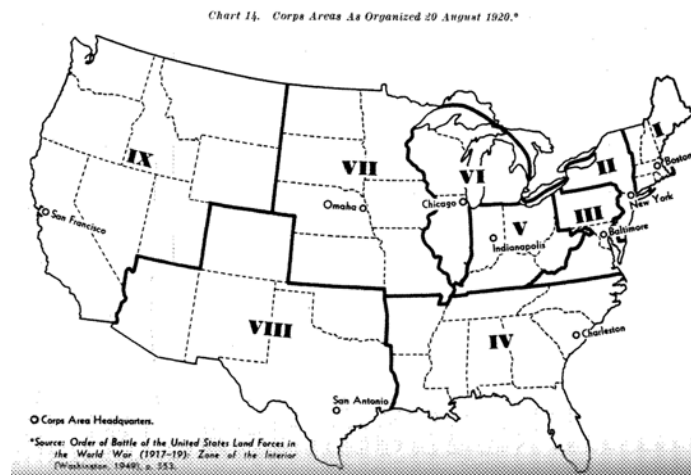
Each Corps Area was to contain one Regular Army division, two infantry divisions of the

National Guard, and three infantry divisions of the Organized Reserves.[174] The Organized

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[170] Weigley (1984), p. 399

[171] The CMTCs "had grown out of the pre-World War I 'Plattsburg idea' promoted by Army Chief of Staff Leonard Wood" where men volunteered to attend military training camps in the summertime in exchange for commissions." [Crossland and Currie (1984), p. 39]

[172] Crossland and Currie (1984), p. 35

[173] Kreidberg and Henry (1955), p. 386

Reserves contained the largest number of units but were the least expensive force to maintain. The Organized Reserves were inexpensive for two reasons. First, the officers in the ORC did not train regularly and were not paid for inactive duty drills.[175] Second, the ERC was non-existent. Weigley writes that the "Enlisted Reserve Corps … was practically nonexistent because there were no means of recruiting it."[176] In 1920, the ORC ended the year with 68,232 officers while the number of enlisted personnel in the ERC was significantly less than 10,000.[177]

Though Congress envisioned the Organized Reserves as a reserve of non-training units with a full complement of officers and enlisted personnel, what they got instead was a cadre force with a large number of reserve officers and very few enlisted personnel. This cadre force was different from those proposed in the past. Instead of an all-cadre force as proposed by Calhoun and Upton, the Organized Reserves were a component of a cadre augmented force with a mobilization order of: (1) Regular Army, (2) National Guard, and (3) Organized Reserves.

5.2—A CADRE REGULAR ARMY

Weigley argues that soon after passing the National Defense Act of 1920 "the goals … broke down because Congress and the executive gave them lip service but little practical

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[174] Palmer (1941), p. 175

[175] "Members of the ORC could not count on two weeks of active duty each year, as could members of the National Guard, and there was no pay at all for inactive duty drills… The 'average' reservists had a 1 in 4 chance of getting active duty training in a given year." [Crossland and Currie (1984), p. 45]

[176] Weigley (1984), p. 401. In their history of the Army Reserve, Crossland and Currie do not discuss the Enlisted Reserve Corps because of its small size. They wrote: "Because of the small inter-war size of the Enlisted Reserve Corps, this chapter (on the interwar period) is restricted almost totally to the Officer's Reserve Corps." [Crossland and Currie (1984), p. 34].]

[177] "The Enlisted Reserve Corps, created by the National Defense Act of 1920, was of very minor importance between World Wars I and II. It consisted of only 6000 men in 1928, and by 1936 its ranks numbered less than 4000." [Crossland and Currie (1984), p. 35-36]

support."[178] In 1921, Congress reduced the size of the Regular Army from the 280,000 called

for by the NDA of 1920 to 150,000.[179] Congress further cut the size of the Army in 1922 to

125,000 and to 118,750 in 1927.[180] It was left up to the War Department as to how to make

these personnel cuts. John McAuley Palmer explained that "it would obviously be impossible

to retain all of the organizations that were created upon the passage of the National Defense

Act of 1920."[181] According to Palmer, there were two alternatives: the Washingtonian

solution, "reduce the strength of the regular army proper, and leave the machinery for

training and developing the citizen army intact," or the Uptonian solution, "retain the nine

infantry divisions though each would be merely an ineffective skeleton at greatly reduced

strength."[182] The General Staff favored the Uptonian solution and it was adopted by the War

Department.[183] The Regular Army maintained the same number of units outlined by the

National Defense Act of 1920. These units retained all officers but cut enlisted strength to

meet the authorized size. The average enlisted to officer ratio fell from 18 between 1900 and

1916 to 10 between 1920 and 1939.[184] The Regular Army of the 1920s was a cadre force.

A cadre Regular Army remained into the 1930s when General Douglas MacArthur

took over as Army Chief of Staff. Weigley argues that MacArthur was troubled because he

thought: "a Regular Army skeletonized in order to be expansible provided no force for

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[178] Weigley (1984), p. 400

[179] This was a reduction from 261 troops per 100,000 residents to 140 troops per 100,000 residents. [U.S. Census Bureau (1975), p. 1140-1143 and U.S. Census Bureau (2002), p. A-1]

[180] The reductions to 125,000 and 118,750 troops are equivalent to reductions to 116 troops per 100,000 residents and 111 troops per 100,000 residents respectively. [U.S. Census Bureau (1975), p. 1140-1143 and U.S. Census Bureau (2002), p. A-1]

[181] Palmer (1941), p. 178

[182] Palmer (1941), p. 178

[183] Palmer (1941), p. 179. Note that since this was not a decision that affected the National Guard, Congress did not intervene.

[184] U.S. Census Bureau (1975), p. 1140-1143

prompt readiness even to meet relatively small emergencies."[185] MacArthur believed that the

Army needed at least a moderate-sized rapid reaction force. During the 1930s, he argued for

this rapid-reaction force in front of Congress on numerous occasions.[186] Congress rejected

MacArthur's plan, however, since it called for a Regular Army of 165,000,[187] a force much

larger than Congress or the President was willing to pay for according to Weigley.[188]

Although it appeared from this proposal that MacArthur was a cadre opponent, he

responded to depression-induced budget cuts with a cadre proposal similar to those of

Calhoun and Upton. In 1934, Lewis Douglas, Franklin Roosevelt's budget chief directed that

$90 million be trimmed from the military budget by furloughing "officers on half pay" and

"stating that he intended to order between 3,000 and 4,000 army officers off active duty."[189]

Even though MacArthur earlier argued against a skeletonized force, he argued *for* a

skeletonized force in this situation:

> "If you have to cut everything out of the National Defense Act, the last element
> should be the Officer Corps. If you had to discharge every soldier, if you had to do
> away with everything else, I would still professionally advise you to keep these 12,000
> officers. They are the mainspring of the whole mechanism, each one of them would
> be worth a thousand men at the beginning of a war. They are the only ones who can
> take this heterogeneous mass and make it a homogeneous fighting group."
> - General Douglas MacArthur, 1933[190]

MacArthur's argument sounds similar to those made by Calhoun and Upton. As

expressed by Griffith: "MacArthur's apparently callous reference to preferring enlisted cuts

to officer reductions was clearly a reflection of Uptonian principles and reveals much about

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[185] Weigley (1984), p. 406

[186] Weigley (1984), p. 407

[187] This was the lowest estimate provided by the General staff for a force that would have "several instant
readiness divisions" as well as "provide simultaneously a semblance of adequate garrisons for the outlying
possessions of the United States." [Weigley (1984), p. 407]

[188] Weigley (1984), p. 407

[189] Griffith (1982), p. 129

[190] Griffith (1982), p. 129

his and the army's attitude toward the relationship between manpower and military preparedness."[191] One could also argue that MacArthur was driven by a loyalty to his fellow officers and possibly even future political ambitions. Whatever his motivations, MacArthur proposed a cadre force when faced with budget cuts.

In the end, Congress cut neither enlisted nor officer end strength. The Regular Army remained in cadre status until the Second World War not because Congress or the War Department had planned it that way but because when faced with smaller appropriations from Congress, the professional soldiers at the War Department were attracted to the cadre concept as they had been since Calhoun and Upton first proposed it.

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[191] Griffith (1982), p. 129.

6. CADRE IN WORLD WAR II

Like the army in World War I, the army that fought in World War II looked very different from the peacetime force that preceded it. Before mobilizing for the War, the Army had a total of 187,893 officers and men and the National Guard had 199,491 officers and men.[192] At the peak of the war, the U.S. Army had more than eight million officers and men in uniform.[193] The World War II mobilization had two phases: pre-war mobilization, occurring before Pearl Harbor, and wartime mobilization, after Pearl Harbor. In both of these periods, the Army mobilized by creating cadre units rather than strengthening the National Guard.

6.1—PRE-WAR MOBILIZATION

In the process of mobilizing for World War II, the Army created cadre units. The mobilization plans developed in the 1930s had assumed that there would be a single Mobilization day (M-day) after which the army would need to grow as quickly as possible.[194] However, the mobilization for World War II occurred gradually. Mobilization began on September 8, 1939 when President Roosevelt proclaimed "a limited national emergency" and authorized a small increase in the size of the army (17,000 regulars; 35,000 national guardsmen).[195] Over the next year, Congress funded larger increases in the size of the

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[192] Kreidberg and Henry (1955), p. 549. The relative size of the Regular Army in 1939 was 144 troops per 100,000 residents and the relative size of the National Guard was 153 troops per 100,000 residents. [U.S. Census Bureau (1975), p. 1140-1143 and U.S. Census Bureau (2002), p. A-1]

[193] U.S. Census Bureau (1975), p. 1140-1143

[194] Kreidberg and Henry (1955), p. 541

[195] Millis (1956), p. 274. In 1939, the Regular Army had 189,839 troops in uniform (145 troops per 100,000 residents), and the National Guard had an authorized strength of 200,000 (153 troops per 100,000 residents). President Roosevelt's plan increased the size of the Regular Army by nine percent (to 158 troops per 100,000

ground forces. Kreidberg and Henry argue that the War Department chose to spend this money on the Regular Army because "a gradually expanding Regular Army would furnish increasing numbers of trained cadres who could be employed to expand the Army further. It was a kind of expansible progression which was envisaged: basically in keeping with Upton's theory that the Regular Army furnish the cadres for vastly expanded wartime armies."[196] The military professionals in the War Department clung to Upton's expansible Regular Army. It is unclear whether this was due to an adherence to Upton's arguments for a professional military (against the militia) or because they thought it was more cost-effective to create cadre Regular Army units than spending money to train and equip new National Guard units. Regardless of their motivation, the War Department created cadre units with Regular Army officers rather than focusing their efforts on the National Guard.

In 1940, the number of troops on active duty began growing rapidly. In August of 1940, President Roosevelt signed a bill calling the National Guard into Federal Service for one year.[197] In September of 1940, he signed the Selective Service Act, which provided for an Army of 1,400,000: 500,000 regulars, 270,000 National Guardsmen, and 630,000 draftees.[198] These force increases became irrelevant after the attack on Pearl Harbor, when the Army began mobilizing as quickly as possible.

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residents) and the National Guard by 18 percent (to 180 troops per 100,000 residents). [U.S. Census Bureau (1975), p. 1140-1143 and U.S. Census Bureau (2002), p. A-1]

[196] Kreidberg and Henry (1955), p. 575

[197] Weigley (1984), p. 427. The bill restricted the use of the National Guard to the Western Hemisphere.

[198] Millis (1956), p. 275. Compared to the end-strength of the Regular Army and National Guard at the end of 1939, this was a 263 percent increase in the size of the Regular Army (excluding draftees; 595 percent including draftees) and a 35 percent increase in the size of the National Guard. [U.S. Census Bureau (1975), p. 1140-1143]

6.2—WARTIME MOBILIZATION

Two cadre forces were mobilized during World War II. First, the Regular Army scattered its officers across new units to serve as cadre to train and lead these units. This was an extemporized cadre force as the Army created this force from a peacetime Regular Army that did not have enough officers to lead even its existing units. The second cadre force mobilized during World War II was the Organized Reserves. However, because of the need for officers to lead new "draftee" units, very few Organized Reserve units were deployed with the same cadre leaders that they were assigned in peacetime.

6.2.1—An Extemporized Cadre Force

After the Pearl Harbor attack, the Army ramped up mobilization.[199] Weigley recounts that the War Department created "new divisions … through a cadre system, whereby a quota of experienced officers and enlisted men would be withdrawn from a parent division to form the organizing and training nucleus of a new division."[200] The process of creating these divisions was envisioned to take "*ten to twelve months*…from activation to combat readiness: seventeen weeks for establishing initial organization and accomplishing the thirteen-week basic training program; thirteen weeks of unit training up to and including the regimental level; fourteen weeks of combined training, to include at least one division-versus-division maneuver."[201] Initially, the cadre was to comprise ten percent of a division (172 officers and 1,190 enlisted men) but it was increased several times until it

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[199] Because all War Department plans had assumed a single M-Day, there were few relevant plans on which to base this multi-phase mobilization. For a review of pre-WWII mobilization plans, see Kreidberg and Henry (1955), p. 382-492.

[200] Officers for these units "would undergo special training at the service schools to prepare them for their heavy burden as the divisional cadre. Most of the officers for the new division would come from officer candidate schools." [Weigley (1984), p. 436]

[201] Weigley (1984), p. 437 (emphasis added). This process is outlined in more detail in Quigley (1942).

reached twelve percent (216 officers and 1,460 enlisted men).[202] The cadre was drawn from Regular Army units whose leadership was split in two so that half could be assigned to new "draftee" divisions.[203] This was an extemporized cadre force, built during wartime out of necessity, not planned for in peacetime.

World War II served as a test of the effectiveness of extemporized cadre units.[204] The experience of the 88th infantry division is generally referenced as a success story of a cadre division.[205] In one normalized comparison of combat effectiveness, the 88th infantry division ranks as the most effective American combat division deployed to Europe.[206] On the other side, the 106th infantry division is often referenced as a failure of a cadre division in combat.[207] However, a significant portion of the ineffectiveness associated with the 106th infantry division was attributed to the fact that the cadre that was supposed to train and lead the division was in a constant state of flux.[208] The cadre mobilization as envisioned by Calhoun and Upton did not go exactly as planned in World War II. Cadre units were nearly always given the lowest priority when it came to officers.[209] This caused significant personnel turbulence, which may have led to the deployment of some units that were not fully ready for combat.

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[202] Bailey (1991), p. 4

[203] The name for units created from scratch in World War II varies. Sometimes they are referred to as draftee divisions and sometimes as cadre divisions.

[204] A "real" cadre force would have had a surplus of officers ready to train and lead the cadre units at the outset of the war. This extemporized cadre force spread the existing Regular Army across as many units as possible.

[205] See Brown (1986) and Dupuy (1987)

[206] Combat effectiveness was measured by Combat Effectiveness Values that were derived using the Quantified Judgment Model, a combat simulation model developed by the Historical Evaluation and Research Organization. This model calculated the combat power of a unit in an engagement from data in the Historical record of the engagement. For more detail see: Dupuy (1987), p. 70.

[207] Durr (1992)

[208] Durr (1992). For a full review of some of the problems associated with training new units and a discussion of possible solutions see Townsend (1950).

[209] Durr (1992)

6.2.2—Mobilizing the Organized Reserves

The Army also mobilized Organized Reserve units during World War II. These cadre units would have been the first true cadre force maintained in peacetime to be mobilized for war. However, Crossland and Currie argue that even though "some people have given the Organized Reserve credit for furnishing 26 infantry divisions during the war. This credit is in error … 'When the decision was taken to activate the division and other units of the Organized Reserve early in 1942, few of the Reserve officers originally assigned to their units were available for duty with them.'"[210] Most of the officers in the Officers' Reserve Corps had been stripped from their assigned units to serve in under-strength Regular Army and National Guard units.[211] Therefore, although this cadre-like force had existed before the war, its units were stripped of cadre to fill shortfalls in other units. This is also a concern for the cadre forces analyzed in this dissertation. In the event that AC and RC units are under strength during peacetime, it is likely that the leaders of cadre units will be removed from their units and assigned to AC or RC units that would deploy sooner.

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[210] Crossland and Currie (1984), p. 67
[211] Bailey (1991), p. 4

7. CADRE DISSAPPEARANCE

In the period following World War II, two cadre forces existed for a brief period of time. First, the Organized Reserves were explicitly recognized by the War Department as a cadre force. Second, the Regular Army was skeletonized. However, cadre proposals disappeared because the Army perceived a new, more imminent, threat. The U.S. Army perceived the Soviet Union as both a larger and more imminent threat than any it had previously faced. Cadre units were of less value in a war when masses of troops would be needed in months rather than years. Following the Korean War, the Army slowly eliminated cadre units. The Organized Reserves became the fully-manned Army Reserve and manning levels of Regular Army units were maintained near authorized levels. The period following World War II can be characterized by a brief return to dependence on peacetime cadre forces followed by the gradual disappearance of anything resembling a cadre unit or proposal.

7.1—A POST-WAR SKELETONIZED FORCE

At the end of World War II, the Army quickly demobilized, though not as quickly as it had after World War I. Weigley argues that this was because "the War Department was sensitive enough to Soviet ambitions to desire a generally cautious demobilization," but "Congress and the new administration of President Harry S. Truman felt obliged to yield to the public cry that, after the longest American war since the Revolution, citizen soldiers should be returned swiftly to their homes."[212] Faced with an uncertain environment,

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[212] Weigley (1984), p. 486

Congress and the President decided to extend the Selective Service Act for two years after World War II to maintain a one million-man army.[213] However, on March 31, 1947 the Selective Service Act expired, which led to what Millis refers to as "the skeletonization of the armed forces."[214]

After the expiration of the Selective Service Act, there was little debate about the structure of the peacetime army. The structure laid out in the National Defense Act of 1920 stayed in place: a Regular Army backed by the National Guard supplemented by the Organized Reserve. The cadre proposals of Calhoun and Upton had disappeared and Weigley argues that "Uptonian contempt for the citizen soldier was dying among the Regular officer corps" and that World War II "assured the triumph of the John McAuley Palmer school of thought, confident that the citizen soldier could be a good soldier, over the Emory Upton school."[215] Despite the fact that cadre proposals disappeared, in practice, two cadre forces remained: the Organized Reserves and a skeletonized Regular Army.

7.1.1—The Organized Reserves: A Recognized Cadre Force

A cadre force, the Organized Reserves, remained the third source of wartime manpower behind the Regular Army and National Guard. After World War II, the War Department stated that "All Organized Reserve Corps units will initially be organized as C units, with officers only."[216] While the Organized Reserves had existed as a cadre force since

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[213] The end-strength of the Army in 1946 and 1947 was 1.9 million (1,318 troops per 100,000 residents) and 991,000 (682 troops per 100,000 residents) respectively. [U.S. Census Bureau (1975), p. 1140-1143 and U.S. Census Bureau (2002), p. A-1]

[214] Millis (1956), p. 316.

[215] Weigley (1984), p. 486

[216] Crossland and Currie (1984), p. 86. In reality, in the post World War II period, the Organized Reserves units were assigned no more than sixty percent of their commissioned *officer* strength. This was due mainly due to a lack of incentives for individuals to join the Organized Reserves: "the only appeal the Army could actually

its creation in 1920, this was the first time this was explicitly acknowledged by the War

Department. The Enlisted Reserves Corps ceased to exist and Organized Reserve units were

maintained under the assumption that there would be available sufficient personnel to fill

out these units in wartime. It is likely that the experiences of World Wars I and II led the

War Department to feel that it could depend on wartime conscription to fill out these units.

7.1.2—A Return to a Cadre Regular Army

The Regular Army was also a cadre force between World War II and the Korean

War. By 1948, the total ground forces of the United States (Army + Marines) totaled

631,000.[217] The threats from the Soviet seizure of Czechoslovakia and the Berlin Blockade

led Congress to re-enact the Selective Service Act in 1948. This increased the size of the

Army by about 100,000 men.[218] However, Weigley argues that the army remained

skeletonized: "except for the 1st Infantry Division in Germany … the Army …

skeletonize(d) its divisions."[219] Entering the Korean War, the U.S. Army was larger than it

had been entering nearly every previous war, but like all previous wars, nearly all of its units

were under strength. During the Korean War, under strength units were brought to full

strength using conscription.

7.2—REFORMS TO ELIMINATE CADRE

After the Korean War, the Army went through a number of organizational changes.

This led to the disappearance of cadre forces. In the 1950s, the threat of Soviet power led to

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make, given the paucity of membership benefits in the ORC, was an appeal to patriotism." [Crossland and Currie (1984), p. 83].

[217] Millis (1956), p. 317. This was equivalent to 428 troops per 100,000 residents.

[218] Weigley (1984), p. 501

[219] Weigley (1984), p. 503. The officer to enlisted ratio increased from an average of six in 1946-1947 to an average of seven in 1948-1950. [U.S. Census Bureau (1975), p. 1140-1143]

a better resourced Army Reserve (formerly the Organized Reserve) through the Reserve Forces Act of 1955. The Organized Reserve was no longer a cadre force. In the 1960s, Secretary of Defense Robert McNamara led reforms to increase the readiness of all reserve units and eventually eliminated all Army Reserve combat units. These changes gradually eliminated any remaining cadre units that existed in the U.S. Army.

7.2.1—Reserve Forces Act of 1955

The Reserve Forces Act of 1955 ended the existence of the Organized Reserves as a cadre force. With the passage of this act, the Army Reserve (formerly the Organized Reserves) was to increase its personnel levels to near one-hundred percent of authorized strength. This change occurred because the cadre structure of Army Reserve units prior to 1955 was seen by many as a major deficiency of the American military system. Secretary of the Army Robert T. Stevins testified to Congress: "our reserve at the present is inadequate to meet our needs. Its inadequacy is due primarily –yes, I can say almost solely- to the failure to procure the participation of enlisted personnel in adequate numbers in organized units."[220] The desire for high readiness reserve units was driven by the need to have a large pool of trained manpower available quickly to defend against a Soviet invasion of Europe.[221] This marked the end of explicit planning for cadre units in American military policy. However, Crossland and Currie note that even with this new policy, the Army Reserve entered the 1960s under strength.[222]

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[220] Crossland and Currie (1984), p. 122

[221] Many military professionals such as John McAuley Palmer had argued since 1945 that "technological advances … had eliminated the grace of time and distance that had in the past permitted the nation the opportunity to mobilize its untrained citizenry. Modern warfare needed a huge reservoir of trained men." [Stewart (2005b), p. 210]. Therefore, a reserve force with higher readiness was necessary.

[222] Crossland and Currie (1984), p. 134

7.2.2—McNamara Reforms

When Robert McNamara became Secretary of Defense in 1961, noted defense analyst William Kaufman argues that McNamara concluded quickly that "not only did the reserve structure make very little sense in terms of size, [but that] its mission was obscure to say the least."[223] McNamara made a number of recommendations including cutting four National Guard and four Army Reserve Divisions, assigning some of the remaining reserve units as "high-priority" units, and merging the Army Reserve and National Guard.[224] Weigley argues that McNamara's proposals were based on the premise "that the Army must have … National Guard and Army Reserve units really prepared for quick reinforcement of the active Army."[225] McNamara's plans were not fully implemented, though he was able to get support for moving all combat units out of the Army Reserve and into the National Guard.[226] From this point onward, the Army Reserve, formerly known as the Organized Reserve, would maintain only Combat Support (CS) and Combat Service Support (CSS) units and these would no longer be under strength cadre units.[227]

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[223] Kaufman (1964), p. 64

[224] Weigley (1984), p. 532

[225] Weigley (1984), p. 532

[226] McNamara's proposal for integrating the Army Reserve and National Guard was rejected. His compromise was eliminating all combat units from the Army Reserve. [Crossland and Currie (1984), p. 165-177]

[227] "The manning levels of Army Reserve units increased from the 66-70 percent level in 1960 to 93-100 percent as the decade ended." [Crossland and Currie (1984), p. 183]

8.   CADRE IN THE POST-VIETNAM ERA

Cadre forces were proposed after the Vietnam War due to renewed doubts about the readiness of the reserves. The Vietnam War was the first major war where U.S. reserve forces did not provide a significant portion of the manpower.[228] This was due to a choice made by President Lyndon Johnson not to call upon the reserves. Instead, the government relied mainly on conscripts. Weigley argues that this represented a shift back to Uptonian contempt towards the citizen soldiers: "there is at least a suggestion of a neo-Uptonian outlook in the Defense Department's reluctance to call upon citizen reserves for the war in Vietnam."[229] However, there is very little evidence that Uptonian logic had any effect on Johnson's decision not to call on the reserves. Crossland and Currie argue that: "the best historical judgment of the decision not to employ Reserve component units … in Vietnam is that Johnson had made an almost purely political decision."[230] Crossland and Currie go on to argue that the main "political" factor driving Johnson's decision was that activating the reserves would signal to Congress and the public that the country was at war, something he wanted to avoid.[231] Although it appears that Weigley might have been incorrect in attributing this decision to resurgence of Uptonian contempt for the National Guard, this decision did

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[228] For the first three years of the Vietnam War Lyndon Johnson refused to mobilize the reserves (either National Guard or Army Reserve). In 1968, Johnson finally mobilized some Army Reserve units but they were only a small fraction, less than five percent, of the total army force involved in Vietnam. [Crossland and Currie (1984), p. 208]

[229] Weigley (1984), p. 556

[230] Crossland and Currie (1984), p. 195

[231] "Lyndon Johnson was gradually involving the United States in a land war in Asia, yet he was disguising his every move … There was 'general satisfaction' in Congress, reported E.W. Kenworthy for the *New York Times*, 'that the President had decided to increase the draft and postpone a decision on calling up reserve units.' The President had become 'increasingly sensitive,' reported the Times, 'to the possible political effects of a reserve call-up.' … Calling up the Reserve Components, stated one study of this period, would not have been consistent with Johnson's attempts to portray Vietnam as 'a limited war of short duration which could be fought with little domestic dislocation." [Crossland and Currie (1984), p. 195]

have a negative impact on the state of the reserves after the war. Crossland and Currie note that "the Army Reserve ended the 1960's in disrepair and disarray …. Reservists were characterized as summer soldiers—draft-dodgers in the eyes of some Regulars."[232]

To address the problems with the reserves, the Army adopted the Total Force Policy following the Vietnam War. The Total Force Policy was a "major transformation" where the Army Reserve would be "an essential partner in the Total Army."[233] The decision to increase reliance on the reserves renewed the debate about cadre units.

8.1—A NEW CADRE DEBATE

In June 1972, General William C. Westmoreland wrote that "only Regular Army forces in being can achieve the levels of readiness required."[234] Crossland and Currie write that Westmoreland recommended that "the Regular Army be considered a cadre that could be expanded rapidly in an emergency." [235] According to Westmoreland, this Army would "serve as a hedge against the high risk associated with the heavy reliance on the Reserve Components."[236] This was the first time that a cadre force had been explicitly recommended since the early twentieth century. Crossland and Currie argue that "the expansible army of John C. Calhoun had been rejected in 1916 and 1920 when the Army took firm steps toward

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[232] Crossland and Currie (1984), p. 211

[233] Crossland and Currie (1984), p. 212. Prior to the total force policy there had been little integration of active Army and the Army Reserve units. Crossland and Currie describe the situation in 1967: "the Army had not converted the Army Reserve units to the more modern Tables of Organization and Equipment then in the active Army … Active Army and Army Reserve units were no longer compatible. They were not organized and equipped in such a manner as to allow rapid integration into the active Army upon mobilization." [Crossland and Currie (1984), p. 176]

[234] Crossland and Currie (1984), p. 216. Westmoreland's own words in a letter to President Nixon dated June 30, 1972.

[235] Crossland and Currie (1984), p. 216

[236] Crossland and Currie (1984), p. 216. Westmoreland's own words in a letter to President Nixon dated June 30, 1972.

establishing a federal reserve force as a means of expanding the active establishment, but the

cadre concept still seemed to enjoy some popularity."[237] Westmoreland's recommendations

were for the most part disregarded, but they show that the cadre idea remained in the minds

of military professionals.[238]

In an August 1972 article in *Army* magazine, General Hamilton H. Howze proposed

what he called a "cadre system" for the reserves.[239] This cadre system was different from

those of Calhoun and Upton. Howze proposed that reserve divisions maintain all their part-

time personnel but replace their leadership with Regular Army personnel. Rather than

arguing for skeletonized units led by Regular Army personnel in replacement of reserve

units, Howze proposed integrating Active Component personnel into Reserve Component

units to increase the readiness of reserve units. Howze was not alone in making this

proposal, Colonel David R. Hampton wrote a similar proposal in 1973.[240]

The proposals of Westmoreland, Howze, and Hampton showed that the cadre idea

had not disappeared all together. However, these proposals were given little attention by

those making military policy at the time. The general acceptance of the Uptonian doctrine

that had existed in the War Department in the early 20th century seemed to have disappeared

in the Department of Defense of the 1970s.

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[237] Crossland and Currie (1984), p. 216
[238] It is also likely that Upton's history of the Army was part of the curriculum when Westmoreland attended West Point from 1932-1936.
[239] Howze (1972)
[240] Hampton (1973)

8.2—CONTINUED CONCERN ABOUT THE RESERVES

After the Vietnam War, it took a number of years for the Army to adapt to the All-Volunteer Force and reach its authorized strength. In the late 1970s and early 1980s, the Army struggled to recruit and retain personnel, and many units were under strength.[241] During this period, there was continued debate about the readiness of the reserves and the prudence of the total force policy. Weigley discusses this situation as it was in 1984: "despite recent assignment of National Guard and Reserve formations as "roundout" or "affiliated" units linked with active Army divisions, the role of the reserves in the Army of the future is as murky as at any time in this long history. Most Regular officers of the 1980's have had as little confidence in the citizen-soldiers as had Emory Upton himself, in large part because the sophisticated new weaponry of the post-Vietnam period aggravated the difficulties of keeping citizen soldiers ready for mobilization."[242] Despite these concerns, the total force policy remained a key component of defense policy for many years to follow.

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[241] Carter (1990), p. 12. Rostker (1992), p. 34
[242] Weigley (1984), p. 590

9. CADRE IN THE COLD WAR DRAWDOWN

Like the end of all previous wars, the end of the Cold War sparked a debate about the appropriate size and structure of the peacetime military. After the fall of the Berlin wall, there was a desire to downsize the military because there no longer appeared to be an imminent threat to American interests. The perceived threat changed once again. This led many to call for a peace dividend.[243] They argued that without an imminent threat the U.S. could downsize its military without increasing military risk. However, a number of military professionals and analysts felt that it was necessary to hedge against the threat of a resurgent Soviet Union.[244] They argued that although the threat was less likely, it still existed with increased warning time. This led some to propose changing some AC divisions into cadre divisions rather than eliminating them. These proposals are similar to those proposed by Calhoun and Upton in that units would be maintained with only officers and NCOs in peacetime. However, these proposals differed in that the entire force would not be maintained in cadre status like Calhoun or Upton's forces but instead only a few cadre units would be maintained in addition to the AC and RC forces in the Army. These cadre proposals were studied in-depth during this period. However, cadre proposals once again disappeared from the military policy when the perceived threat from Russia decreased in the years that followed. This chapter discusses both the re-emergence and disappearance of cadre proposals during the Cold War drawdown.

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[243] Larson et al (2001), p. xiv

[244] See the sections that follow for a discussion of the organizations and individuals who felt this was worth considering.

9.1—THE END OF THE COLD WAR

Two events marked the end of the Cold War. First, in December of 1988, Soviet President Gorbachev announced to the United Nations that he would withdraw some troops from Eastern Europe. Almost a year later, on November 9, 1989, the East German government announced that its citizens were welcome to cross into West Berlin, leading to the fall of the Berlin Wall.[245] For military planners, these events marked the end of an era. Cold War planning had focused on total mobilization. The threats in the post-Cold War era were less clear. Realizing the changing threat environment, the Army was the first to propose changes in force structure. On the day before Thanksgiving 1989, "the Army preempted analysts in the Office of the Secretary of Defense and on the Joint Staff when … it volunteered to Defense Secretary Dick Cheney the cutting of five divisions and 330,000 people by the end of Fiscal Year 1994."[246] These proposed changes were in the works for many years before the fall of the Berlin wall: "the Army's proposal is the culmination of work … quietly began 2 ½ years (before) … trying to anticipate reduced force levels and lower defense budgets." [247] Schemmer argues that the Army foresaw reduced force levels as "inevitable because of pressures to reduce US budget deficits, lowered tensions in Europe, and increasing support for a conventional arms reduction agreement."[248] The Army's proposal called for a 17 percent reduction in Army end-strength "divided in roughly equal proportions among active-duty forces (a cut of 135,000 troops), Reserve and National Guard

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[245] Troxell (1997), p. 8
[246] Schemmer (1990)
[247] Schemmer (1990)
[248] Schemmer (1990)

units (also 135,000 troops) and direct-hire civilians."[249] Although this proposal was not

adopted in its original form, it served as the impetus for a number of analyses concerning the

appropriate way to reduce the size of the U.S. military. Some of these analyses revived the

idea of cadre units as a component of the nation's force structure.

9.2—PRELIMINARY CADRE DISCUSSIONS

As noted in the previous section, many individuals in the Army and the Department

of Defense had begun planning for force reductions before the fall of the Berlin Wall. As

noted in the previous section, the Army proposed force cuts in a traditional manner. Others

looked for more novel approaches to reducing the size of the force.[250] Some of these

approaches included cadre units. It appears that most of the discussions about cadre units

prior to 1990 were informal. Nonetheless, a few individuals in the defense community had

begun to write and speak about cadre units.

In July of 1989, Suzanne M. Crow of the Center for Naval Analyses wrote a report

reviewing the debate over a cadre system in the Soviet Union.[251] Crow wrote that the

Warsaw Pact negotiations had driven the Soviet Union to consider "a complete

reorganization of the armed forces along the lines of a cadre-militia system."[252] She goes on

to write that the proposed reorganization would transform "the Soviet Union's large,

conscripted standing army, into an armed force consisting of a significantly smaller regular

army, manned either by volunteers or conscripts, and a territorial militia based on universal

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[249] Schemmer (1990). In 1989, the number of personnel on active duty totaled 765,000 or about 310 troops per 100,000 residents. This was already significantly lower than the Cold War peacetime average of 440 troops per 100,000 residents. This proposal would lower the number of personnel on active duty to 256 troops per 100,000 residents. [U.S. Census Bureau (2003), p. 345 and U.S. Census Bureau (2002), p. A-1]

[250] Duncan (1985) proposed the Standby Reserve Training Corps as a force that could bridge the gap between the reserves and conscription.

[251] Crow (1989)

[252] Crow (1989), p. 1

service."[253] The cadre force proposed in the Soviet Union was, in a sense, similar to the

proposals of Calhoun and Upton, with the majority of the army's combat power in cadre

units. Although this report is one of the first to discuss cadre before the end of the Cold

War, the author writes nothing about the applicability of the cadre concept to the United

States.

In what appears to be the first public mention of cadre units in the United States

before the end of the Cold War, in late 1989 Assistant Secretary of Defense David Chu

proposed exploring "in more depth" a "move to a higher proportion of cadre units … That

is, we might try to retain primarily our highly skilled, extensively trained, experienced

personnel."[254] Since reducing the size of the force would require "forcing out" trained

personnel, cadre units could retain experienced personnel as a hedge against the need to

increase the size of the force in the future. In response to arguments that there would be

enough time to create new units from scratch in future wars, Chu argued that the cadre

approach "seems more logical" because "it is doubtful that, in the event of a contingency,

we could simply 'turn up' the training dial and run the force at higher rates for a few months

and have a well-trained and competent force."[255] Chu's major concern was a lack of

experienced officers: "we cannot get a battalion commander overnight, and a ship captain

cannot become competent and confident in the use of his vessel overnight. That takes years

of training and experience."[256] Although Chu recommended that cadre units are "a topic

worthy of research," he provided little further detail. He also commented that the "cadre

solution is not a particularly popular idea in many quarters of the military, and it might be

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[253] Crow (1989), p. 1
[254] Gotz and Brown (1989), p. 117
[255] Gotz and Brown (1989), p. 117
[256] Gotz and Brown (1989), p. 117

viewed skeptically by people outside the DoD who would argue that it favors retaining

commissioned and senior noncommissioned officers at the expense of junior enlisted

personnel."[257] This is likely because individuals outside of the DoD would see cadre

proposals coming from Army officers as being self-interested rather than in the best interest

of the nation.

9.3—CBO (1990)

The first detailed cadre proposal in the post-Cold War period was published in

February 1990 by the Congressional Budget Office (CBO).[258] The CBO report analyzed

various alternatives for reducing the size of the military. At that time, the United States was

negotiating reductions in the number of personnel deployed to Europe under the

Conventional Forces in Europe (CFE) treaty. To comply with the CFE treaty the United

States would have to remove two Army divisions from Europe and possibly demobilize

them.[259] Furthermore, CBO argued that the George H.W. Bush administration felt that

"reduced military risk may permit the United States to make reductions in force larger than

the minimum ones required by the treaties."[260] The administration's plan (as conceived of by

CBO) would cut two AC divisions and three RC divisions.[261] In addition to analyzing the

force reductions called for by the administration and the CFE treaty, CBO examined three

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[257] Gotz and Brown (1989), p. 117

[258] CBO (1990)

[259] CBO (1990), p. 4. At the time that CBO (1990) was published, it was assumed that the CFE treaty would require that the two divisions to be removed from Europe be demobilized. However, CBO (1990) notes that: "NATO's proposed CFE treaty … may not require that all troops withdrawn from Europe be demobilized … Thus, it is possible that the United States could relocate some of its troops to stateside bases." However, CBO argues that they assume the two divisions will be demobilized because "the Secretary of Defense … has said he would reduce U.S. forces once the treaty is in place." [CBO(1990a), p. 4]

[260] CBO (1990), p. 11

[261] CBO (1990), p. 11

other alternatives. One of these alternatives was a cadre augmented force. The five

alternatives examined by CBO (1990) are shown in Table 9.1.

Table 9.1—CBO (1990) Alternative *Army* Force Structures[262]

Alternatives	Annual Savings (billions)	Personnel Additions(+) / Reductions(-)		Division Additions(+)/Reductions (-)		
		AC	*RC*	*AC*	*RC*	*Cadre*
I. Minimum Changes Required by Treaties	$5	-77,000	0	-2	0	0
II. Possible Administration Cuts	$14	-132,000	-130,000	-3	-2	0
III. Large Cuts but Maintain Flexibility with Cadres	**$17**	**-199,000**	**0**	**-7**	**0**	**+5**
IV. Large cuts but Maintain Flexibility with Selected Reserves	$18	-240,000	+75,000	-7	+2	0
V. Large Cuts	$27	-272,000	-149,000	-8	-3	0

The third alternative examined by CBO is a cadre augmented force. This alternative

eliminates seven AC divisions but creates five new cadre divisions. CBO envisioned the

cadre divisions as "retaining on active duty about 3,000 senior non-commissioned officers

(paygrades E-6 and above) and officers (paygrades O-2 and above) for each division."[263] At

the time, an AC division was assigned about 15,000 personnel.[264] The cadre divisions

envisioned by CBO would retain about 20 percent of their manpower during peacetime.

CBO discussed a number of details regarding how they envisioned cadre divisions.

The CBO report discusses how cadre units would be trained in peacetime and filled out in

wartime. In peacetime, CBO envisioned that the mission of the cadre division would be "to

remain ready to fight a war in Europe by maintaining up-to-date war plans, performing

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[262] CBO (1990), p. 3, 8, 44. CBO (1990) examines force structure alternatives across all four services. Here, we focus only on the force structure alternatives relating to the Army.

[263] CBO (1990), p. 16

[264] Bailey (1991), p. B-1

limited training, and maintaining equipment."[265] Under this concept, "training … would

involve individual leadership training, physical fitness, instructor training, and unit training in

the form of command post exercises. The purpose of the training would be to ensure that

the cadre is prepared to train individual reservists in the event of mobilization for war and

knows how to conduct combat operations."[266] This is similar to the maintenance cadre units

discussed in the second paper of this dissertation. In wartime, CBO envisioned that "the unit

would be filled out with … individual ready reserve (IRR) personnel who have been off

active duty for fewer than 18 months."[267] The CBO likened their proposal to the cadre units

that existed in Germany at the time.[268]

CBO also discussed the drawbacks to their cadre plan. First, CBO was concerned

that IRR personnel would be scattered across the U.S. and "it might be difficult for all of

them to respond immediately to a mobilization call."[269] Second, CBO worried that 3,000

soldiers might not be enough to maintain all of the equipment during peacetime. CBO's

third concern was that "active-duty military might take an unfavorable view of assignment to

… cadre units in peacetime because there would be few if any soldiers to lead. This situation

might lead to the assignment of less than the best qualified active-duty officers to the cadre

divisions."[270] CBO's final concern was the need for the army to "revamp its personnel

policies significantly in order to build up the pool of IRR personnel who have had active-

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[265] CBO (1990), p. 16
[266] CBO (1990), p. 16
[267] CBO (1990), p. 16
[268] See discussion of German cadre from GAO (1991) in Section 9.8.3.
[269] CBO (1990), p. 17
[270] CBO (1990), p. 17

duty experience."[271] Since the cadre proposal would lead to an AC that was 25 percent

smaller, there would be fewer personnel transitioning to the IRR. CBO proposed that the

Army might "have to accept more of the shorter, two-year initial enlistments and restrict the

number allowed to reenlist" in order to create a large enough IRR.[272] CBO notes that this

could increase training and other costs related to personnel turnover but that this cost would

likely be offset by lower payroll costs due to the increase in the fraction of junior

personnel.[273]

CBO concluded, with little justification, that "cadre divisions, once mobilized,

should offer at least as much military capability as selected reserve divisions." [274] This claim

is not supported by any evidence. CBO goes on to argue that "cadre divisions offer(ed) a

means of retaining-at least for a number of years- the capability of some of the high-quality,

well-trained personnel who are now in the U.S. military."[275] This is true no matter what the

relative effectiveness of cadre divisions. CBO closes their analysis by suggesting that the

army test the cadre division concept before full implementation: "the Army might, for

example, create one or two cadre divisions and evaluate the success of the concept before

attempting to create … them."[276] These tests were never carried out.

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[271] CBO (1990), p. 17. This remains a significant issue for the cadre forces analyzed in this dissertation. See Paper II for more detail.
[272] CBO (1990), p. 17
[273] CBO (1990), p. 17. CBO adds $130 million to their cost estimate for the cadre augmented force to cover any additional costs from changes in personnel policies.
[274] CBO (1990), p. 18
[275] CBO (1990), p. 18
[276] CBO (1990), p. 18

9.4—CADRE GAINS MOMENTUM

The CBO proposal of February 1990 spurred a number of public discussions and reports related to cadre units. In chronological order, cadre forces were discussed:

- In **March 1990**, Lieutenant Colonel Charles E. Heller published a report recommending a cadre augmented force for the U.S. Army.[277] He proposed a dual cadre system, one in the Regular Army similar to those proposed by Calhoun and Upton, and one in the reserves. In his report, Heller concludes that the cadre system "offers an opportunity to create a viable force within peacetime budget constraints."[278]

- In **May 1990**, Robert D. Reischauer, Director of the CBO, testified before the Senate Committee on Armed Services about "approaches that increase the reliance on reserve forces in the U.S. military." [279] In his testimony, he discusses a cadre augmented force similar to that outlined in CBO (1990) as one alternative.[280]

- In **May 1990**, Lieutenant Colonel William E. Carter published a War College Individual Study Report entitled: *The Feasibility of a Cadre Approach to Mobilization.* Carter argues that, in the Cold War drawdown, "the proposal most feasible for meeting the national security strategy and military strategy of the 21st century is the cadre system."[281] Carter briefly cites the successes of the German and Israeli cadre

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[277] Heller (1990). Heller makes the same argument in an October 1991 article in *Military Review* [Heller (1991)].
[278] Heller (1990), p. 59
[279] Reischauer (1990), p. 1
[280] Reischauer (1990), p. 1
[281] Carter (1990), p. 25

systems but provides little detail regarding how these systems would work in the United States.[282]

- In **May 1990**, retired General Hamilton H. Howze wrote an article arguing against cadre force. His article was titled: "Shrink Army If We Must, But Don't Hollow It Out."[283] Howze argued against cadre units from a morale perspective based on his own experiences serving in an under strength unit. He argues that "on the basis of that four-year experience and 31 additional years of military service … it is easy to say that there is no more stultifying, uninspiring, depressing and seemingly useless activity than that of serving in an under strength military unit. This is true in part because the officers and NCOs serving in such a unit know that the government places little importance on its combat effectiveness or even on its existence."[284] However, there is a difference between an under strength unit which was intended to be at full-strength and a cadre unit which was intended to be under-strength. The peacetime duties assigned to the cadre are important in terms of personnel development and morale.

As of mid-1990, the cadre concept had received public support from CBO and some professional Army officers but not everyone agreed on its desirability. Neither Congress nor the George H.W. Bush administration had publicly commented on the issue. This would change in August of 1990.

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[282] See Section 9.8.3 for a discussion of the German cadre system that existed in 1991. The Israeli cadre system maintains a small core of permanent officers (the Keva-Permanent) who are responsible for the army's leadership, training, and war preparations. In wartime, these officers would lead units filled out by individuals from the Hova (compulsory service into which everyone is conscripted upon reaching age eighteen) and the Miluimm (a reserve of soldiers who have completed compulsory service). [Carter (1990), p. 18]

[283] Howze (1990)

[284] Howze (1990)

9.5—RECONSTITUTION

On August 2, 1990, the George H.W. Bush administration outlined a post-Cold War military strategy for the United States that included cadre forces. A key component of the new strategy was maintaining the ability to generate new forces. In a speech at the Aspen Institute, Bush expressed this goal: "Our strategy will guard against a major reversal in Soviet intentions by incorporating into our planning the concept of *reconstitution* of our forces. By the mid-nineties the time it would take the Soviets to return to the levels of confrontation that marked the depths of the Cold War will be sufficient to allow us to rely not solely on existing forces but to generate wholly new forces. The readiness to rebuild, made explicit in our defense policy, will be an important element in our ability to deter aggression."[285] Although he did not explicitly refer to cadre units in his speech, they were a component of the reconstitution strategy.[286]

On the same day as the President's speech, the *New York Times* published an article outlining the administration's new military strategy, which included new "Army reserve" (cadre) divisions.[287] Gordon writes that the new strategy would "take advantage of the longer warning time of a possible Soviet attack on Europe by creating new Army reserve divisions that could be brought up to full strength only if needed for a prolonged crisis. These 'reconstitutable' units would be partly manned and their equipment would be held in storage."[288] The article goes on to say that the "new 'reconstitutable' Army reserve divisions

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[285] Bush (1990), emphasis added.
[286] A 1992 Congressional Research Service (CRS) report explains that cadre units are a key component of reconstitution: "reconstitution has three major programmatic components," the first of which is a "reliance on cadre units and stored equipment." [Goldich (1992), Summary]
[287] Gordon (1990). Gordon refers to cadre divisions as Army reserve divisions. It is important to note that these are different from the full-manned Army Reserves that existed at the time.
[288] Gordon (1990)

.... sometimes known as 'cadre' divisions" were "part of a larger proposal … for building up forces in a crisis. The broader plan calls for storing equipment … but retaining officers who could provide training and leadership if reconstituting became necessary."[289] This plan is consistent with the CBO (1990) proposal for a cadre augmented force. However, at the time there were some objections. Gordon writes that Army officials were "cautious about the idea of creating two 'reconstitutable' reserve divisions, expressing concern that it could lead to even sharper cuts."[290] Nonetheless, the administration's new strategy as outlined in the President's speech and *New York Times* article further legitimized the cadre concept and led to its inclusion in almost every force structure analysis undertaken during the Cold War drawdown period.

9.6—ARMY ANALYSIS OF CADRE

The Army began examining the concept of cadre divisions in April 1990.[291] The Army chose to undertake their own analysis "to determine the strategic role and operational requirement for cadre divisions and to assess the feasibility of incorporating them into the Total Force."[292] Holcomb argues the main conclusions of the study were that "cadre divisions may be feasible if they can be adequately trained and adequately equipped," and

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[289] Gordon (1990)

[290] Gordon (1990).

[291] Tice (1991a)

[292] Holcomb (1992), p. 13. A copy of the corresponding report was requested by the author in March of 2007 from the Defense Technical Information Center (DTIC). In November of 2007, this request was cancelled by DTIC. This report appears to have been the most comprehensive analysis of cadre units and their applicability to the U.S Army performed in the early 1990s. The citation for this report is: Chrisman, Daniel W., "Cadre Division Concept Study (Final Draft)", U.S. Army Office of the Deputy Chief of Staff for Operations: Washington, DC, 1990. There also appears to have been a follow on report published by The Combined Arms Center-Combat Developments Force Design Directorate that examined three options for cadre unit design. This report was published on June 15, 1992 according to globalsecurity.org. (http://www.globalsecurity.org/military/agency/army/division-cadre.htm). The author's request for this document was also cancelled by DTIC.

that "although some lessons can be learned from reviewing cadre systems of other nations, differences in culture, landpower requirements, and military strategy preclude their wholesale adoption."[293] The first conclusion is important because it shows that the Army was not adverse to the cadre concept and thought it was feasible if implemented correctly. The second conclusion is important because many of the cadre proposals we have discussed in this paper have been based on the success of cadre systems in foreign nations. These analogies may not be directly applicable to the U.S. situation.

Based on early drafts of this report, the Army provided the House and Senate Armed Services Committees with a letter describing their preliminary results in February of 1991. In a later analysis of cadre forces, CBO wrote that "the letter suggest(ed) that forming some cadre units may be feasible."[294] However, CBO was critical of the letter in that it did not "specify what kinds of personnel should man the cadre units in peacetime," (active or reserve) or "how many individuals would be assigned to cadre units in peacetime."[295] CBO noted that the letter "suggests that the number assigned could range widely, from as little as four percent to five percent of full peacetime manning up to 60 percent."[296] The letter showed that the specifics of cadre had not been fleshed out as "the Army (was still) in the process of refining its cadre concept."[297] The uncertainties surrounding the implementation of cadre units led Congress to direct "the Army to delay carrying out the cadre concept and to study it further."[298]

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[293] Holcomb (1992), p. 14-16.
[294] CBO (1992), p. 27
[295] CBO (1992), p. 28
[296] CBO (1992), p. 28
[297] CBO (1992), p. 28
[298] CBO (1992), p. 28

With support from the Army and the executive branch,[299] the cadre concept had made it to the national spotlight for the first time since the early twentieth century. Cadre forces were examined in nearly all of the major force structure reviews performed in the early 1990s.

9.7—FORCE STRUCTURE REVIEWS

In the Cold War drawdown period, a number of studies were commissioned to analyze the appropriate size and structure of the post Cold War military. Nearly all of these reports discussed cadre in some form. The first of these studies was published in December of 1990 as the "Total Force Policy Report to the Congress." [300] This report reviewed the appropriateness of the existing force structure with "particular emphasis on the role of the reserve components."[301] The report says of cadre that the DoD "should continue to examine ways to retain access to trained personnel … Some forces could be placed in a cadre status, in which equipment would be retained along with a core of experienced personnel to train new forces."[302] The recommendations in this report appear to be based on the cadre proposal in CBO (1990). The DoD report recommended maintaining two divisions in cadre status that should be "manned by about 3,000 personnel apiece and … have only a skeleton support structure."[303] This is exactly the same type of cadre unit

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[299] There was also some support in Congress for the cadre idea as shown by a provision in the National Defense Authorization Act of 1991 that called for the Army to test the cadre concept by placing "at least one active division in cadre status as a reserve training division by the end of fiscal year 1992." [United States Congress (1990), p. 268]. However, this test was never carried out.

[300] DoD (1990)

[301] DoD (1990), p. i

[302] DoD (1990), p. 60

[303] DoD (1990), p. 67

proposed in CBO (1990).[304] The Total Force Policy Report provided little further detail and simply recommended that the DoD continue to study cadre units.

While the DoD study group was developing the "Total Force Policy Report to the Congress," the joint staff was working to develop the Base Force. "The aim of the Base Force was to develop a new military strategy and force structure for the post-Cold War era while setting a floor for force reductions, in large part to hedge against the risks of a resurgent Soviet/Russian threat."[305] The Base Force was outlined in the 1992 Joint Military Net Assessment.[306] It called for a force that retained two cadre divisions in addition to ten AC divisions and six RC divisions. Like the Total Force Policy Report, this report provided very little detail on implementing cadre units except to say that they were a key part of the reconstitution strategy that required sustaining "a cadre of quality leaders."[307] The joint staff appears to have seen cadre units as a short-term hedge against Soviet resurgence and not a permanent part of the force structure as they wrote that "over the longer term … reconstitution probably will increasingly involve creating new units- basically from scratch."[308] It appears that the joint staff saw cadre units as a way to reduce the number of separations over the short term but felt that over the long-term, cadre units would be phased out as the excess personnel left the force and were not replaced. This is important to keep in

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[304] However, the DoD report proposed two cadre divisions while the CBO (1990) report had proposed five cadre divisions.
[305] Larson et al (2001), p. 9
[306] Powell (1992a)
[307] Powell (1992a), p. 3-9
[308] Powell (1992a), p. 10-2

mind, as cadre units are more attractive in drawdown periods than they are in build-up periods.[309]

Another large force structure review was published by the RAND Corporation in 1992.[310] This study, mandated by Congress, was designed to help "evaluate the mix or mixes of reserve or active forces … that are considered acceptable to carry out expected future military operations."[311] Although the report did not explore cadre units in much depth, it did include them in two of the seven force structure alternatives it analyzed. These alternatives included the Base Force and a scaled down version of the Base Force. As the other force structure reviews discussed in this section, this study did not discuss the implementation of cadre units in much detail. These details were left to a number of smaller studies undertaken in the post-Cold War period.

9.8—FOCUSED CADRE STUDIES

A number of more focused studies were published during the Cold War drawdown to look specifically at the implementation of cadre forces. These studies explored different variants of cadre forces and discussed in detail issues relating to organizing, training, and filling cadre units that were ignored in higher-level force-structure reports.

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[309] In drawdown periods, transforming active divisions to cadre divisions allows the Army the involuntarily separate fewer personnel. Additionally, equipment for cadre units is already available in a draw-down while equipment must be purchased in a build-up (see Paper II for a detailed discussion of options for equipping cadre units).

[310] Rostker (1992)

[311] Rostker (1992), p. xix

9.8.1—IDA Ready-Standby Organization

One of the first reports to examine cadre-like forces was published by the Institute for Defense Analyses in November of 1990.[312] This report proposed the Ready-Standby Organization for army forces.[313] This Ready-Standby organization rotates all active duty units through Ready (active duty) status and Standby (cadre) status over time. The authors claimed that by implementing the Ready-Standby Organization in the Army that "the DoD can preserve the number of fully trained units in its current force despite budget cuts, and can make those units mobilizable within the longer warning times now expected."[314] The Ready-Standby Organization was never tested or implemented but this report was one of the first to argue that cadre-like forces might be an appropriate way to maintain military capability at a lower cost given an increase in warning time. The Ready-Standby Organization was markedly different from previous cadre proposals in that Tillson et al claimed it had the additional benefit of "improving the readiness of mobilization units because they would be staffed by a group of soldiers who achieved a high level of *cohesion* and efficiency while serving in the ready units."[315] This makes the Ready-Standby Organization (or some modified version) worth considering for the cadre augmented force proposed in this dissertation.[316]

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[312] Tillson et al (1990)

[313] See section 3.3.1 of Paper II for a detailed description of the Ready-Standby Organization.

[314] Tillson et al (1990), p. ES-1

[315] Tice (1991b), emphasis added.

[316] The applicability of the Ready-Standby Organization to the cadre augmented force proposed in this dissertation is explored in Paper II of this dissertation.

9.8.2—LMI Cadre Report

One of the most detailed reports released about cadre units was published in February of 1991 by the Logistics Management Institute (LMI).[317] This report analyzed four different cadre configurations. It explored the possibility of maintaining cadre leaders in the AC or the RC for both "full structure" and "leadership" cadre divisions. The full structure cadre division would "retain some of the critical leadership positions and some of the soldier positions to facilitate realistic training and maintenance," while the leadership cadre division would "retain a large number of senior personnel of the division to preserve skills and experience."[318] The structure of the AC and RC versions of each of these cadre units was to be the same, with the only difference being the status of the cadre leaders during peacetime. Table 9.2 shows the manning levels and relative costs for each of the alternative cadre configurations examined in the LMI report.

Table 9.2—Bailey (1991) Cadre Alternatives

Cadre Division Type	Officers	Enlisted	% TOE	% AC Cost
AC Full Structure	691	2,947	25%	31%
AC Leadership[319]	420	1,366	12%	5%
RC Full Structure	691	2,947	25%	6%
RC Leadership	420	1,366	12%	4%

The LMI report concludes that cadre forces were worth considering but that the choice of "cadre design and component should consider cadre performance along several dimensions, weighing the design parameters of cost, flexibility, and time required against the

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[317] Bailey (1991)

[318] Bailey (1991), p. 13

[319] Bailey (1991) assumes that the leaders of an AC Leadership unit are dual-hatted and that only 25 percent of their cost is assigned to the cadre unit. See Paper II of this dissertation for a more in-depth discussion of dual-hatted cadre leaders and their cost.

timely need to reconstitute units."[320] This report provided much more detail than any

previous report by providing explicit cadre structures and analyzing some of the relative cost

tradeoffs.

9.8.3—GAO Foreign Cadre Report

In August of 1991, the Government Accountability Office (GAO) published a

report examining the reserve systems of other countries to "identify features that the U.S.

Army might consider as it restructures its forces."[321] This report was requested by Congress

"because cadre divisions will require a substantive change in the way the Army organizes its

mobilization forces."[322] The majority of the report was focused on the cadre reserve systems

used in Germany and the Soviet Union.

Summarizing the cadre system used in the Soviet Union, the GAO wrote: "as of

April 1991, about 102 of the estimated 185 Soviet divisions were cadre divisions staffed at 5

to 50 percent of their wartime personnel levels."[323] This report included no more detail

about cadre forces in the Soviet Union than was included in Crow (1989). However, GAO

did note that "an additional feature of the Soviet Army is that units are maintained at various

states of readiness based on their role and priority for deployment."[324] The Soviet Union

maintained a continuum of forces that included cadre units at different levels of readiness.

The continuum of forces concept was suggested by Assistant Secretary of Defense David

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[320] Bailey (1991), p. 19
[321] GAO (1991)
[322] Tice (1991b)
[323] GAO (1991), p. 24
[324] GAO (1991), p. 25.

Chu in 1989 and could still be useful today.[325] Cadre units could be manned at different levels in peacetime depending on their expected mobilization order.

The German cadre system of the early 1990s was much different from that in the Soviet Union. Germany included cadre units as a component of each unit rather than having separate cadre units. The GAO describes: "in Germany, one of each brigade's five combat battalions is a cadre battalion that, upon mobilization, would be filled using surplus active forces and some reserves."[326] After testing the cadre concept, Germany found that the cost savings from cadre units were lower than expected. The GAO wrote: "while Germany looked to cadres to save money, its tests show that cost savings may be less than anticipated."[327] Although this dissertation focuses on cadre BCTs, integrating cadre units into the total force below the BCT level may also be of interest to military planners in the United States.

The main recommendations of the GAO report were that the Army should consider implementing cadre units at force levels other than the division and that they test the cadre concept before implementing it. The report also emphasized that it is important to keep in mind the differences between the military system in the U.S. and those of other countries. Although both the Soviet Union and Germany had cadre augmented forces as of 1991, they both relied on conscription. This made issues of "filling" cadre units with new soldiers much

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[325] In 1989, David Chu, Assistant Secretary of Defense, Program Analysis and Evaluation wrote: "Everything is potentially variable in the kind of future we may confront, and there are no particular assumptions that ought to be seen as sacrosanct. This includes some of the classifications used in the defense manpower community itself. Too frequently, we have resorted to rigid, compartmentalized classifications in attempting to categorize personnel. It is common, for instance to say that there are active forces and there are reserve forces … The view that arguably should be taken is that there is actually a *continuum* of forces, and we should compel ourselves to look at manpower issues in this way, rather than viewing force elements as existing in discrete "compartments" that are sharply differentiated from one another." [Gotz and Brown (1989), p. 115, emphasis added]

[326] GAO (1991), p. 4

[327] GAO (1991), p.4

simpler than it would be for a volunteer military. As far back as Upton, cadre proponents

had argued for cadre forces based on the success of similar systems in Europe. However,

except for a brief time in American military history, the U.S. has almost exclusively depended

on volunteers while most of Europe depended on peacetime conscription. This limits the

usefulness of analogies between these cadre systems.

9.8.4—CBO (1992)

In September of 1992, a report from CBO discussed cadre forces publicly for one of

the final times.[328] The report was similar in nature to CBO (1990) in that it analyzed

alternative force structures, two of which included cadre units. The first cadre augmented

force analyzed in CBO (1992) included five cadre divisions manned with active duty

personnel "at a level of 25 percent of the manning of an Army division."[329] The second

cadre augmented force included eight cadre divisions "manned sparingly, typically at levels

equal to only about 5 percent or 10 percent of full manning."[330] While CBO did not provide

much detail about the design of these cadre units, they did estimate their costs. They

estimated the annual cost of a cadre division with 25 percent of authorized personnel on

active duty to be 70 percent of a RC unit. For a cadre division with five percent of

authorized personnel, CBO estimated the annual cost to be 15 percent of a RC unit.[331]

These estimates are consistent with those from the LMI report although CBO did not

explore as many different cadre unit designs.

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[328] CBO (1992)
[329] CBO (1992), Summary. This is slightly higher than the 20 percent manning assumed in CBO (1990).
[330] CBO (1992), Summary.
[331] CBO (1992), p. 31

In their report, the CBO also discussed the drawbacks to the cadre forces examined. First, CBO questioned the readiness of cadre units. CBO questioned Army estimates that cadre units could be ready for combat in Europe in 12 to 15 months. CBO commented that this estimate may not be reliable and that "a new estimate of the time required to ready cadre units for combat might be much longer than a year" because it depends on the peacetime manning level of the unit.[332] Second, CBO was concerned with morale and asked: "would active officers assigned to some of these units … view the assignments so unfavorably that morale would plummet."[333] The validity of this concern depends on the peacetime duties of the cadre as discussed in Paper II of this dissertation. This report was the last time that cadre units were seriously considered by military analysts. Cadre faded from policy discussions as the new administration came to control the policy debate.

9.9—CADRE DISSAPPEARS AGAIN

Following the 1992 report from CBO, cadre forces were rarely mentioned in public military policy discussions. There are two reasons for this. First, as early as 1991, planning for reconstitution had been generally ignored as planners focused more on AC and RC forces since they would be the first to deploy. Second, the Clinton administration came into office in 1992 and began their own force structure review called the Bottom-Up Review, which ignored cadre forces completely. This was due to the vanishing threat of a resurgent

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[332] CBO commented that "It is unclear what kind of cadre unit the Army assumed in developing" their estimate for readiness. [CBO (1992), p. 34]. In the Army's letter to the Senate Armed Services Committee, they wrote: "Cadre divisions could be formed in either the reserve components or active component … However, we believe that availability for deployment is dependent upon the time it takes to fill and train the unit and not the component. This is very much an open issue and … is one of the key elements to be studied by the Training and Doctrine Command." [Tice (1991a)]

[333] CBO (1992), p. 37

Russia and the desire to achieve greater cost savings.[334] The lack of priority for cadre units combined with the disregard from the new administration led to the final disappearance of cadre from military policy debates.

9.9.1—Failure to Plan for Reconstitution

Even before the Clinton administration came into office, some military analysts had begun to question the commitment of the government to planning for reconstitution. In the fall of 1991, John Brinkerhoff wrote an article in *Strategic Review* discussing the need for a clear reconstitution policy.[335] Brinkerhoff argued that the country lacked a clear reconstitution plan and that "the outlook for actually putting reconstitution into place is doubtful."[336] Brinkerhoff's article shows that reconstitution had begun to fade from being "one of four major pillars of the new national security strategy," to a secondary concern for defense planners. Brinkerhoff noted that "many defense planners … believe reconstitution is simply too hard to do," and therefore ignored it.[337]

Brinkerhoff was not the only one to question the government's commitment to reconstitution. In April of 1992, two Army officers at the Industrial College of the Armed Forces published a report looking at the manpower challenges of planning for reconstitution.[338] They concluded that "while reconstitution is a part of the United States' National Military Strategy, it remains a concept without sufficient definition, funding, or

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[334] See discussion in Section 9.9.2

[335] Brinkerhoff (1991)

[336] Brinkerhoff (1991), p. 20

[337] Brinkerhoff (1991), p. 20. Brinkerhoff felt strongly about the need to plan for reconstitution. Brinkerhoff would later serve on a committee at the National Research Council on which he would propose cadre units as a way to "alleviate the problem of overused active and reserve components" for peacekeeping duties. This recommendation is included as a secondary consideration in the appendices of National Research Council (1999).

[338] Peterson and Patrick (1992)

adequate emphasis."[339] Before the Clinton administration took power, reconstitution was already deemphasized by defense planners even though it was an explicit part of the National Military Strategy of the United States.[340] The change in administration would further reduce the emphasis on reconstitution and cadre forces.

9.9.2—Bottom-Up Review

When Bill Clinton took office in 1993, he promised to cut defense spending by about $10 billion more per year than the previous administration.[341] Upon assuming office, Secretary of Defense Les Aspin initiated a comprehensive review of the nation's defense strategy and force structure.[342] In October of 1993, the DoD published the results of this review in the Report of the Bottom Up Review (BUR).[343] This report does not refer to either cadre or reconstitution. The report rejects the need for a reconstitution strategy because "the Cold War is behind us. The Soviet Union is no longer the threat that drove our defense decision-making for four and a half decades- that determine our strategy and tactics, our doctrine, the size and shape of our forces, the design of our weapons, and the size of our defense budgets-is gone."[344] With no threat of a Soviet resurgence, the justification for cadre units was gone. Force planning shifted almost exclusively to finding the right mix of AC and RC forces that would be ready to deploy to two nearly simultaneous Major Regional Contingencies (MRCs).[345] This has remained the focus of force planners until the early 21st

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[339] Peterson and Patrick (1992), p. 58

[340] Powell (1992b), p. 7

[341] Larson et al (2001), p. 44

[342] Troxell (1997), p. 13

[343] Aspin (1993)

[344] Aspin (1993), p. 1

[345] Not everyone agreed with this focus. In a most extreme example, Hart (1998) argues that the end of the Cold War allows the military to return to a force of citizen soldiers like that which existed before the NDA of 1920.

century when the need to build a force capable of sustaining long –term rotation became a

significant planning focus. This shift to planning for rotation is the impetus for considering

cadre units once again in this dissertation.

10. CONCLUSION

In this paper, we have explored the history of cadre forces in the United States. Cadre forces were proposed for two reasons: either there was a change in the perceived readiness of the reserves or there was a change in the perceived threat. Cadre forces were proposed in the nineteenth century by Calhoun and Upton because of a mistrust of the militia. However, problems with the militia were fixed through legislation in the early twentieth century and the ideas of Calhoun and Upton were laid to rest. The concept of cadre forces re-emerged in the twentieth century in response to changes in both the perceived threat and readiness of the reserves. Cadre forces were debated in the early part of the twentieth century as the Army reconsidered both the warning time provided by geographic isolation and the readiness of the reserves. The perceived threat changed again after the First World War. This led to the creation of the Organized Reserves. Instead of replacing the National Guard, the Organized Reserves were third in the mobilization order. Following the Second World War, cadre proposals disappeared as the threat environment changed once again. After World War II, a larger active army was maintained to be able to deploy quickly to fight the Soviet Union in Europe. Cadre units could not deploy quickly enough to be useful. Cadre units were discussed again briefly at the end of the Vietnam War due to concerns about the readiness of the reserves. However, these proposals were given little attention. Finally, the fall of the Soviet Union led to a significant change in the threat environment. At the end of the Cold War, cadre units were proposed as a way to hedge against a resurgent Soviet Union. These cadre forces were the most similar to those proposed in this dissertation. However, a declining Russian threat caused cadre proposals to disappear once again.

This paper has discussed the history of previous cadre proposal. This history is important for two reasons. First, it distinguishes the cadre forces analyzed in this dissertation from those that have been rejected in the past. Second, it shows that there are some similarities between the cadre forces analyzed in this dissertation and past proposals.

10.1—DIFFERENCES

In this paper, we have seen that cadre units are not a new idea but a concept that have been part of American military policy from the very beginning. However, many of these cadre proposals never gained wide support. It is important to understand the differences between previous cadre proposals and the cadre forces analyzed in this dissertation so as not to immediately dismiss the possibility of cadre forces because they have failed to be adopted in the past.

The first distinguishing feature of the cadre forces analyzed in this dissertation is that they are not justified by a mistrust of the militia. The cadre proposals of Calhoun and Upton were based on a mistrust of the militia. In this dissertation, cadre units are proposed as an additional component of the total force and not as a replacement for the National Guard. The argument for integrating cadre units is based on the desire to minimize costs given a required level of readiness and says nothing about the readiness of the National Guard. It is important to make this distinction because cadre forces are often associated with a mistrust of the militia, and this dissertation *does not* argue that the National Guard is ineffective.

The second important difference is that the cadre forces analyzed in this dissertation are cadre *augmented* forces while the cadre forces proposed by Calhoun and Upton were *all* cadre forces. Calhoun and Upton proposed cadre units as the nation's primary fighting force.

In a globalized world with the threat of short-warning military scenarios, an all cadre force is no longer feasible. Due to this fact, the United States maintains a large standing army reinforced by the National Guard. The cadre forces proposed in this dissertation would be the third component of the total force, providing a cost-effective way to maintain the capability to fight long wars with rotation.

The third important distinction is between high- and low-readiness cadre forces. All cadre forces proposed in the past were conceived of as high-readiness cadre forces. From the cadre forces of Calhoun and Upton to the cadre forces proposed in the Cold War drawdown, all of these forces were expected to be ready to deploy as quickly as possible. The cadre forces of Calhoun and Upton would be the nation's primary fighting force, and therefore, would need to be ready to deploy in a matter of months. The cadre units proposed in the Cold War drawdown were expected to be ready to deploy in about a year. The cadre units proposed in this dissertation may have over three years before the first unit is needed, due to the nature of rotation. [346] This distinction is important because many of those who rejected cadre proposals in the past based on concerns about readiness may wish to consider cadre in the rotational context described in this dissertation.

A final important distinction to keep in mind is that previous cadre proposals did not discuss using volunteers to fill out cadre units in wartime. The proposals of Calhoun and Upton provided little to no discussion of how cadre units would be filled out. The post-World War II Organized Reserves assumed that units would be brought to full-strength through wartime conscription. The cadre proposals in the Cold War drawdown assumed that personnel in the Individual Ready Reserve (IRR) would be used to fill out cadre units. This

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[346] See Paper I for an analysis of the tradeoffs between cost savings from a cadre augmented force and readiness.

dissertation assumes that cadre units could be filled out by increasing the recruitment of

volunteers in the early years of a war.[347] Although previous cadre proposals have hinted at

using volunteers, they generally assumed that a wartime draft would provide the needed

manpower. Previously, raising volunteers was difficult because of the short time (one year or

less) desired for a cadre unit to be ready to deploy. The extra time provided by rotation

(three years) allows us to consider year-by-year increases in end-strength as a way to fill out

cadre units in wartime.

10.2—SIMILARITIES

Previous cadre proposals also have a number of things in common with the cadre

forces analyzed in this dissertation. These similarities provide us with estimates for a number

of the parameters needed to evaluate a cadre augmented force. First, the cadre unit

structures proposed by Calhoun and Upton and those proposed after the Cold War provide

a reasonable bound on the number of officers and NCOs we might consider retaining in a

peacetime cadre BCT. Calhoun proposed retaining all officers and no NCOs, Upton

proposed retaining only a portion of officers. The post-Cold War cadre proposals envisioned

units with only a fraction of officers and NCOs. These proposals provide a context in which

to consider the structure of cadre BCTs in this dissertation. The structures considered in

Paper II of this dissertation range from retaining all officers and NCOs to retaining only a

fraction of officers and NCOs in each grade. All are within the range of previous cadre

proposals.

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[347] In this dissertation, we also consider using the IRR to fill some junior positions in cadre units. See Paper II
for a more detailed discussion.

Some previous cadre proposals have also attempted to estimate the cost of a cadre unit during peacetime. None of the cadre proposals prior to the end of the Cold War provided cost estimates. However, a number of the post Cold War proposals estimated the cost of different types of cadre units. These costs, discussed in this paper, are within the same range as those estimated in this dissertation.[348]

Finally, previous cadre proposals provided estimates of cadre readiness. The cadre forces of Calhoun and Upton were assumed to be ready to deploy in months. The cadre forces of the post Cold War period were expected to deploy in about a year. These show that it appears more than reasonable to assume that cadre units could be ready to deploy *three years* after the beginning of a war as we did in this dissertation.

10.3—OPPOSITION TO CADRE

Cadre proposals have been rejected many times in the history of the United States. In many instances, Congress has been the main opponent of these proposals. Congressional opposition may remain an issue for the cadre forces proposed in this dissertation. Replacing active duty or reserve units with cadre units would affect the districts of a number of Congressmen. These representatives are likely to lobby aggressively against the unproven cadre augmented force. Congressional opposition has often defeated cadre proposals in the past. Therefore, it is important that any cadre proposal be as clear as possible about the underlying assumptions and reasoning. The cadre augmented force proposed in this dissertation can either reduce the cost of national defense or provide additional defense capability at the same cost when planning for long rotational wars. Emphasizing this

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[348] See Paper II for a full discussion of the peacetime cost of a cadre unit and its relationship to cadre structure and organization.

reasoning and the associated assumptions is important to provide a clear picture of the

tradeoffs involved in creating a cadre augmented force. Papers I and II of this dissertation

attempt to do exactly this.

APPENDIX A—HISTORICAL SIZE OF THE UNITED STATES ARMY

Table A.1 shows the absolute and relative size of the U.S. Army from 1794 to 2007 referenced in the body of this paper.

Table A.1—Historical Size of the U.S. Army

Year	U.S. Population	Army Officers	Army Enlisted	Total Army	Army Per 100,000 Residents	Year	U.S. Population	Army Officers	Army Enlisted	Total Army	Army Per 100,000 Residents	Year	U.S. Population	Army Officers	Army Enlisted	Total Army	Army Per 100,000 Residents
1794	4,480,922	235	3,578	3,813	85	1866	35,712,351			57,072	160	1938	129,890,430	13,975	171,513	185,488	143
1795	4,618,849	212	3,228	3,440	74	1867	36,423,856	3,056	54,138	57,194	157	1939	130,779,853	14,486	175,353	189,839	145
1796	4,756,776	232	3,536	3,768	79	1868	37,135,361	2,835	48,231	51,066	138	1940	131,669,275	18,326	250,697	269,023	204
1797	4,894,703	232	3,536	3,768	77	1869	37,846,866	2,700	34,253	36,953	98	1941	133,634,927	99,536	1,362,779	1,462,315	1,094
1798	5,032,630	232	3,536	3,768	75	1870	38,558,371	2,541	34,699	37,240	97	1942	135,600,579	206,422	2,869,186	3,075,608	2,268
1799	5,170,557	232	3,536	3,768	73	1871	39,718,112	2,105	27,010	29,115	73	1943	137,566,231	579,576	6,414,896	6,994,472	5,084
1800	5,308,483	232	3,536	3,768	71	1872	40,877,853	2,104	26,218	28,322	69	1944	139,531,883	776,980	7,217,770	7,994,750	5,730
1801	5,501,623	248	3,803	4,051	74	1873	42,037,594	2,076	26,736	28,812	69	1945	141,497,535	891,663	7,376,295	8,267,958	5,843
1802	5,694,763	175	2,698	2,873	50	1874	43,197,335	2,081	26,559	28,640	66	1946	143,463,187	267,144	1,623,867	1,891,011	1,318
1803	5,887,903	174	2,312	2,486	42	1875	44,357,076	2,068	23,445	25,513	58	1947	145,428,839	132,504	858,781	991,285	682
1804	6,081,043	216	2,518	2,734	45	1876	45,516,817	2,151	26,414	28,565	63	1948	147,394,491	68,178	485,852	554,030	376
1805	6,274,183	159	2,570	2,729	43	1877	46,676,558	2,177	21,963	24,140	52	1949	149,360,143	77,272	583,201	660,473	442
1806	6,467,323	142	2,511	2,653	41	1878	47,836,299	2,153	23,870	26,023	54	1950	151,325,798	72,566	520,601	593,167	392
1807	6,660,463	146	2,629	2,775	42	1879	48,996,040	2,127	24,474	26,601	54	1951	154,125,536	130,540	1,401,234	1,531,774	994
1808	6,853,603	327	5,385	5,712	83	1880	50,155,783	2,152	24,442	26,594	53	1952	156,925,274	148,427	1,447,992	1,596,419	1,017
1809	7,046,743	533	6,444	6,977	99	1881	51,438,181	2,181	23,661	25,842	50	1953	159,725,012	145,633	1,388,182	1,533,815	960
1810	7,239,881	441	5,515	5,956	82	1882	52,720,579	2,162	23,649	25,811	49	1954	162,524,750	128,208	1,276,390	1,404,598	864
1811	7,479,275	396	5,212	5,608	75	1883	54,002,977	2,143	23,509	25,652	48	1955	165,324,488	121,947	987,349	1,109,296	671
1812	7,718,669	299	6,387	6,686	87	1884	55,285,375	2,147	24,519	26,666	48	1956	168,124,226	118,364	907,414	1,025,778	610
1813	7,958,063	1,476	17,560	19,036	239	1885	56,567,773	2,154	25,003	27,157	48	1957	170,923,964	111,187	886,807	997,994	584
1814	8,197,457	2,271	35,915	38,186	466	1886	57,850,171	2,102	24,625	26,727	46	1958	173,723,702	104,716	794,209	898,925	517
1815	8,436,851	2,272	31,152	33,424	396	1887	59,132,569	2,200	24,519	26,719	45	1959	176,523,440	101,690	760,274	861,964	488
1816	8,676,245	735	9,496	10,231	118	1888	60,414,967	2,189	24,830	27,019	45	1960	179,323,175	101,236	771,842	873,078	487
1817	8,915,639	647	7,799	8,446	95	1889	61,697,365	2,177	25,582	27,759	45	1961	181,721,061	99,921	758,701	858,622	472
1818	9,155,033	697	7,458	8,155	89	1890	62,979,766	2,168	25,205	27,373	43	1962	184,118,947	116,050	950,354	1,066,404	579
1819	9,394,427	705	7,801	8,506	91	1891	64,312,128	2,052	24,411	26,463	41	1963	186,516,833	108,302	867,614	975,916	523
1820	9,633,822	696	9,858	10,554	110	1892	65,644,490	2,140	25,050	27,190	41	1964	188,914,719	110,870	862,368	973,238	515
1821	9,957,042	547	5,226	5,773	58	1893	66,976,852	2,158	25,672	27,830	42	1965	191,312,605	112,120	856,946	969,066	507
1822	10,280,262	512	4,846	5,358	52	1894	68,309,214	2,146	26,119	28,265	41	1966	193,710,491	117,786	1,081,998	1,199,784	619
1823	10,603,482	525	5,592	6,117	58	1895	69,641,576	2,154	25,341	27,495	39	1967	196,108,377	143,517	1,298,981	1,442,498	736
1824	10,926,702	532	5,441	5,973	55	1896	70,973,938	2,169	25,206	27,375	39	1968	198,506,263	166,173	1,404,170	1,570,343	791
1825	11,249,922	562	5,341	5,903	52	1897	72,306,300	2,179	25,686	27,865	39	1969	200,904,149	172,590	1,339,579	1,512,169	753
1826	11,573,142	540	5,449	5,989	52	1898	73,638,662	10,516	199,198	209,714	285	1970	203,302,031	166,721	1,155,827	1,322,548	651
1827	11,896,362	546	5,339	5,885	49	1899	74,971,024	3,581	77,089	80,670	108	1971	205,626,048	149,000	972,000	1,121,000	545
1828	12,219,582	540	5,162	5,702	47	1900	76,303,387	4,227	97,486	101,713	133	1972	207,950,065	121,000	687,000	808,000	389
1829	12,542,802	608	5,724	6,332	50	1901	77,870,275	3,468	82,089	85,557	110	1973	210,274,082	116,000	682,000	798,000	380
1830	12,866,020	627	5,495	6,122	48	1902	79,437,163	4,049	77,226	81,275	102	1974	212,598,099	106,000	674,000	780,000	367
1831	13,286,364	613	5,442	6,055	46	1903	81,004,051	3,927	65,668	69,595	86	1975	214,922,116	103,000	678,000	781,000	363
1832	13,706,708	659	5,609	6,268	46	1904	82,570,939	3,971	66,416	70,387	85	1976	217,246,133	99,000	678,000	777,000	358
1833	14,127,052	666	5,913	6,579	47	1905	84,137,827	4,034	63,492	67,526	80	1977	219,570,150	98,000	680,000	778,000	354
1834	14,547,396	669	6,361	7,030	48	1906	85,704,715	3,989	64,956	68,945	80	1978	221,894,167	98,000	670,000	768,000	346
1835	14,967,740	680	6,657	7,337	49	1907	87,271,603	3,896	60,274	64,170	74	1979	224,218,184	97,000	657,000	754,000	336
1836	15,388,084	857	9,088	9,945	65	1908	88,838,491	4,047	72,895	76,942	87	1980	226,542,199	99,000	674,000	773,000	341
1837	15,808,428	873	11,576	12,449	79	1909	90,405,379	4,299	80,672	84,971	94	1981	228,759,809	102,000	675,000	777,000	340
1838	16,228,772	717	8,480	9,197	57	1910	91,972,266	4,535	76,716	81,251	88	1982	230,977,419	103,000	673,000	776,000	336
1839	16,649,116	749	9,942	10,691	64	1911	93,346,101	4,585	79,421	84,006	90	1983	233,195,029	106,000	669,000	775,000	332
1840	17,069,458	789	11,541	12,330	72	1912	94,719,936	4,775	87,346	92,121	97	1984	235,412,639	108,000	668,000	776,000	330
1841	17,681,700	754	10,565	11,319	64	1913	96,093,771	4,970	87,786	92,756	97	1985	237,630,249	110,000	667,000	777,000	327
1842	18,293,942	781	9,999	10,780	59	1914	97,467,606	5,033	93,511	98,544	101	1986	239,847,859	110,000	667,000	777,000	324
1843	18,906,184	805	8,297	9,102	48	1915	98,841,441	4,948	101,806	106,754	108	1987	242,065,469	108,000	668,000	776,000	321
1844	19,518,426	813	7,917	8,730	45	1916	100,215,276	5,175	103,224	108,399	108	1988	244,283,079	107,000	660,000	767,000	314
1845	20,130,668	826	7,683	8,509	42	1917	101,589,111	32,224	387,243	419,467	413	1989	246,500,689	107,000	658,000	765,000	310
1846	20,742,910	2,003	25,864	27,867	134	1918	102,962,946	130,485	2,265,257	2,395,742	2,327	1990	248,718,301	104,000	624,000	728,000	293
1847	21,355,152	2,863	41,873	44,736	209	1919	104,336,781	91,957	759,649	851,606	816	1991	251,988,662	104,000	603,000	707,000	281
1848	21,967,394	2,865	44,454	47,319	215	1920	105,710,620	18,999	185,293	204,292	193	1992	255,259,023	95,000	511,000	606,000	237
1849	22,579,636	945	9,799	10,744	48	1921	107,417,063	16,501	214,224	230,725	215	1993	258,529,384	88,000	480,000	568,000	220
1850	23,191,876	948	9,981	10,929	47	1922	109,123,506	15,667	133,096	148,763	136	1994	261,799,745	85,000	453,000	538,000	206
1851	24,017,021	944	9,770	10,714	45	1923	110,829,949	14,021	119,222	133,243	120	1995	265,070,106	83,000	422,000	505,000	191
1852	24,842,166	957	10,419	11,376	46	1924	112,536,392	13,784	128,889	142,673	127	1996	268,340,467	81,000	407,000	488,000	182
1853	25,667,311	961	9,611	10,572	41	1925	114,242,835	14,594	122,454	137,048	120	1997	271,610,828	79,000	408,000	487,000	179
1854	26,492,456	956	9,938	10,894	41	1926	115,949,278	14,143	120,795	134,938	116	1998	274,881,189	78,000	401,000	479,000	174
1855	27,317,601	1,042	14,869	15,911	58	1927	117,655,721	14,020	120,809	134,829	115	1999	278,151,550	77,000	398,000	475,000	171
1856	28,142,746	1,072	14,643	15,715	56	1928	119,362,164	14,019	122,065	136,084	114	2000	281,421,906	77,000	401,000	478,000	170
1857	28,967,891	1,097	14,821	15,918	55	1929	121,068,607	14,047	125,071	139,118	115	2001	284,167,410	76,000	400,000	476,000	168
1858	29,793,036	1,099	16,579	17,678	59	1930	122,775,046	14,151	125,227	139,378	114	2002	286,912,914	78,000	404,000	482,000	168
1859	30,618,181	1,070	16,173	17,243	56	1931	123,664,469	14,159	126,357	140,516	114	2003	289,658,418	79,954	406,074	486,028	168
1860	31,443,321	1,080	15,135	16,215	52	1932	124,553,892	14,111	120,846	134,957	108	2004	292,403,922	80,585	409,431	490,016	168
1861	32,154,826	-	-	186,845	581	1933	125,443,315	13,896	122,651	136,547	109	2005	295,149,426	80,386	404,458	484,844	164
1862	32,866,331	-	-	637,264	1,939	1934	126,332,738	13,761	124,703	138,464	110	2006	297,894,930	81,725	416,443	498,168	167
1863	33,577,836	-	-	918,354	2,735	1935	127,222,161	13,471	126,015	139,486	110	2007	300,640,434	84,781	428,929	513,710	171
1864	34,289,341	-	-	970,905	2,832	1936	128,111,584	13,512	154,304	167,816	131						
1865	35,000,846	-	-	1,000,692	2,859	1937	129,001,007	13,740	166,228	179,968	140						

The population data for this table was derived from U.S. Census Bureau (2002).[349] The data

on the size of the U.S. army was derived from U.S. Census Bureau (1975) for the years 1794-

1970,[350] U.S. Census Bureau (2003)[351] for the years 1971-2002, and Defense Manpower Data

Center (2008) for the years 2003-2007.[352] All references to the historical size of the army in

this paper are derived from this data.

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[349] U.S. Census Bureau (2002), p. A-1.
[350] U.S. Census Bureau (1975), p. 1140-1143
[351] U.S. Census Bureau (2003), p. 345
[352] DMDC (2008), data derived from December of each year.

APPENDIX B—CALHOUN'S EXPANSIBLE ARMY PLAN

This appendix contains the data derived from John C. Calhoun's "expansible" army plan proposed in 1820. Table B.1 compares the number of personnel at in each rank in the infantry and artillery specialties existing before Calhoun's proposal (pre) and the number recommended by Calhoun for a peacetime army (post). The data are derived from Table E of *Report of the Secretary of War of a Plan for the Reduction of the Army of the United States* (1820).

Table B.1—Calhoun's Expansible Army Plan by Rank and Specialty

	Artillery		Infantry		Total	
Officers	**Pre**	**Post**	**Pre**	**Post**	**Pre**	**Post**
Colonels	2	2	9	9	11	11
Lt. Colonels	6	6	9	9	15	15
Majors	7	7	9	9	16	16
Captains	52	52	90	90	142	142
Lieutenants	84	90	90	90	174	180
2nd Lieutenants	94	90	90	90	184	180
3rd Lieutenants	10	0	0	0	10	0
Cadres	20	0	0	0	20	0
Total	*275*	*247*	*297*	*297*	*572*	*544*
Enlisted (Privates)						
Sergeant Majors	1	0	9	0	10	0
Quartermaster Sergeant	33	0	9	0	42	0
Sergeants	200	135	360	360	560	495
Corporals	296	270	360	360	656	630
Artificers	80	0	0	0	80	0
Gunners	0	810	0	0	0	810
Matrosses	3,780	1,620	0	0	3,780	1,620
Drums. Trump.	0	45	0	90	0	135
Musicians	150	0	198	0	348	0
Armor & Workm.	5	20	9	36	14	56
Work of Ordn.	426	75	0	0	426	75
Soldiers of Train	0	50	0	0	0	50
Privates	0	0	6,120	2,520	6,120	2,520
Total	*4,971*	*3,025*	*7,065*	*3,366*	*12,036*	*6,391*
Total (Officers +Enlisted)	**5,246**	**3,272**	**7,362**	**3,663**	**12,608**	**6,935**

Conclusion

This dissertation has analyzed a cadre augmented force from three different perspectives. The introduction asserts that a force limited to AC and RC units maintains some units at an unnecessarily high level of readiness for ways fought with rotation. The first paper shows that a cadre augmented force can decrease annual costs by billions of dollars by increasing military risk. The second paper explores different design options for a cadre augmented force and identifies the major risks of relying on a cadre augmented force. The third paper shows that cadre proposals are not new to the U.S. Army and that the cadre forces analyzed in this dissertation differ from those that have been proposed in the past. Together, these papers show that a cadre augmented force may be worth considering if the Department of Defense plans to make force structure decisions driven by rotation.

This dissertation points out a number of risks associated with a cadre augmented force. The first paper shows that even though a cadre augmented force can reduce annual costs by billions of dollars, it increases stress on the active force relative to a non-cadre force. Additionally, we find that a cadre augmented force reduces the number of units ready to deploy at a moments notice. This is important if the force planning paradigm ever shifts back to planning for two simultaneous short-warning wars. The second paper shows that a cadre augmented force comes with other risks such as not having enough junior personnel available or not activating cadre units early enough during wartime. The third paper shows that there has been significant opposition to cadre proposals in the past. All of these risks must be considered carefully and weighed against the substantial cost savings offered by a cadre augmented force. This dissertation has presented the information needed to consider

these tradeoffs at a theoretical level. More detailed analysis is needed, especially in regards to the peacetime structure/cost and ability to fill out cadre units in wartime.

A cadre augmented force is not the only way to reduce costs when planning for wars fought with rotation. We might also consider paying some reservists to serve in RC units that deploy more frequently than one year in six as suggested in Klerman (2008). Depending on the size of the incentive required, this could achieve cost savings similar to those of a cadre augmented force without facing many of the risks. Other alternatives may also be worth considering.

This dissertation is not intended to advocate any single force structure. It is simply intended to analyze one option along a continuum of possible readiness/cost force structure tradeoffs. Increasing personnel costs together with increases in non-discretionary spending will likely require making hard force structure decisions in the future.[1] It is hoped that the reader will take away from this dissertation an appreciation for the differences between planning for wars with and without rotation and that the analyses presented here may provide a framework to consider force structure alternatives for rotation.

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[1] In a 2008 interview Secretary of Defense Robert Gages "acknowledged that as manpower costs continue to rise, the U.S. at some point could be faced with a choice between a smaller military or one that is not as well-equipped or cannot range as widely as the current force." [McMichael (2008)]

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